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PART IV:

FEDERAL COMMUNICATIONS COMMISSION

■

National Telephone Network

Standard Plugs and Jacks

Title 47—Telecommunication

CHAPTER I—FEDERAL COMMUNICATIONS COMMISSION

[Docket No. 20774; FCC 76-617]

PART 68—CONNECTION OF TERMINAL EQUIPMENT TO THE TELEPHONE NETWORK

STANDARD PLUGS AND JACKS

Report and Order

INTRODUCTION

In the Matter of Revision of Part 68 of the Commission's Rules to Specify Standard Plugs and Jacks for the Connection of Telephone Equipment to the Nationwide Telephone Network.

1. This proceeding is an outgrowth of our decisions in Docket No. 19528,[1] in which we established a registration program designed to allow users of the nationwide telephone network to connect terminal equipment[2] to the network without the need for carrier-supplied protective couplers ("connecting arrangements"), provided that such equipment complies with standards incorporated into the registration program to protect the network against harm. The standards and registration procedures are contained in a new Part 68 of the Commission's rules.

2. Our decisions in Docket No. 19528 require all terminal equipment, other than PBX and key telephone equipment, to be connected to the telephone network through standard plugs and jacks.[3] This requirement is based on a long history of untrained telephone users installing equipment (such as extension telephones, automatic answering machines, operator's headsets, and conferencing devices) in this manner without causing harm to the telephone network. By following this carrier-promulgated approach, it has been unnecessary to impose additional requirements on installation of registered equipment.

3. We purposefully declined to specify specific standard plug/jack designs in the belief that mutually acceptable designs would be voluntarily arrived at by cooperative action of the affected industry—telephone carriers and telephone equipment manufacturers. We expected that such entities would meet and arrive at suitable designs without Commission involvement. However, because of confusion expressed in numerous inquiries which we subsequently received, we issued a Public Notice[4] inviting interested parties to the Commission's Washington, D.C. offices on specified dates, to provide them a forum for such discussion. On April 12, 1976, at the conclusion of these meetings, we issued a notice of proposed rulemaking herein ("Notice"), (FCC 76-319), which published the consensus views of the attendees of the meetings, and which invited comment thereon. Specifically, we invited comment on the following issues:

(1) Since the attendees had recommended adoption of certain Bell System plug/jack designs which are subject to licensing by the Western Electric Company, whether the Commission should modify the requirements of paragraph 49 of the First Report and Order in Docket No. 19528, supra, which proscribed adoption of any plug designs subject to telephone company licensing or any other telephone company-imposed restrictions;

(2) Whether the meeting-sponsored configurations, set out in the Appendix to the Notice, for use of 6 pin, 8 pin and 50 pin plug/jack arrangements—as well as certain adapters—will accommodate connection of known and presently foreseeable equipment requirements (regardless of whether the recommended Bell System designs or alternatives are adopted); and

(3) Whether certain data configurations of the 8 pin and 50 pin plugs should contain convex keying to prevent the inadvertant insertion of a standard data plug into a standard voice jack, and whether interim standards should be adopted for connection of data equipment, since the proposed designs are not presently in production.

4. We received comments from American Telephone and Telegraph Company (AT&T), GTE Service Corporation and its affiliated domestic telephone operating companies (GTE), Continental Telephone Corporation (Continental), the United States Independent Telephone Association (USITA) representing 1618 non-Bell telephone companies, Dictaphone Corporation, Exxon Enterprises, Inc. (Exxon), International Business Machines Corporation (IBM), Phone-Mate, Inc., Precision Components, Inc., Rixon, Inc., Rollins Protective Services, Inc. (Rollins), the Independent Data Communications Manufacturers Association (IDCMA), Communications Certification Laboratory (CCL), and the New York Public Interest Research Group, Inc. (NYPIRG). Reply comments were filed by AT&T, GTE, Exxon, Rixon, Rollins, IDCMA and NYPIRG.

5. Comments and replies fell generally into the following three categories. First, there were comments addressing the specific issues framed in the Notice with regard to the appropriateness of the proposed plug/jack designs and configurations. Second, there were comments urging adoption of additional plug/jack designs and configurations. Third, there were comments seeking waivers of the Commission's general requirement that telephone terminal equipment (other than PBX and key telephone equipment) shall be connected to the telephone network through the use of standard plugs and jacks. Comments in this third category in essence seek reconsideration of the First Report and Second Report and associated § 68.104 of our rules which have imposed this requirement.

PLUG/JACK DESIGNS

6. Attendees of the meetings recommended that the specific AT&T-proposed "modular" 6 pin and 8 pin "modular" plug/jack designs and 50 pin "ribbon" plug/jack designs detailed in the Notice be adopted as standard, even though the 6 pin and 8 pin designs are subject to licensing by Western Electric, and the Commission proscribed adoption of any plug designs subject to telephone company licensing or any other telephone company-imposed restrictions. Although there were exceptions, the comments generally supported this consensus view, provided that adapters between the standard plug/jack designs and certain pre-existing plug/jack designs which are presently in use are also accommodated in the program. Exxon comments that the language of the Notice which limited supply of certain adapters to telephone carriers, and not customers, was too restrictive. It also comments that our restrictive "paragraph 49 language" should not be varied and that licensing by a telephone company should not be permitted of any plug/jack design which we adopt. IBM comments that AT&T's proposed licensing agreement should accommodate the possibility of foreign manufacture of plugs and jacks and grant rights under worldwide patents as well as United States patents. In reply, AT&T responds by indicating that Exxon's position arguing that AT&T will receive a "windfall" if its designs are adopted subject to patent royalties ignores the "windfall" which AT&T's competitors would receive if AT&T's designs are adopted without payment of royalties. In response to Exxon's second point, AT&T argues that it is entirely appropriate that it be indemnified from liability for patent claims against AT&T arising from the combination of customer-provided equipment and AT&T's facilities, as is currently provided in AT&T's tariffs. In response to IBM's comments, AT&T states that its subsidiary, Western Electric Company, upon request would extend such licenses for manufacture in other countries.[5]

7. The comments which we have received convince us that the AT&T-sponsored plug/jack designs are technically and economically sound and that the public interest would be best served by adoption of these designs. These designs, although extremely small and light, are of a sturdy construction, and because of the manufacturing processes used to produce them, are quite inexpensive. No designs were suggested which were more

[1] Interstate and Foreign Message Toll Telephone Service—First Report and Order, 56 F.C.C. 2d 593 (1975); Memorandum Opinion and Order, 57 F.C.C. 2d 1216 (1976); Memorandum Opinion and Order, 58 F.C.C. 2d 716 (1976); Second Report and Order, 58 F.C.C. 2d 736 (1976); Memorandum Opinion and Order, FCC 76-377 (released April 28, 1976). See 41 FR 17305.

[2] Coin telephones and equipment connected with party-line service are not included within the scope of the registration program.

[3] See particularly First Report and Order, para. 49; Second Report and Order, para. 26; and § 68.104 of our rules. A suitable means of connection for PBX and key telephone equipment has not yet been established.

[4] Public Notice 60105, released January 21, 1976. This Notice was mailed to each entity on AT&T's current mailing list for the dissemination of technical data to equipment manufacturers (some 2,000 entities) and to all parties of record in Docket No. 19528.

[5] The standard agreements attached to our Notice happened to be examples of agreements used where only United States patents are involved.

versatile or cheaper to produce. Furthermore, as noted in the Bell System statement contained in Appendix C of our Notice, wholly apart from our adoption of the standard plug and jack requirement, "the Bell Operating telephone companies have already installed more than 15 million of the 'miniature' jacks and will have installed a total of 30 million of such jacks by the end of 1976," at no additional charge to its customers. For these reasons, we are adopting these AT&T-sponsored designs in the expectation that no additional costs will be passed on to telephone users because of our standard plug and jack requirement.[6] Finally, there was virtually unanimous endorsement of these designs by the attendees at the meetings, and no party filed comments objecting to these designs. However, we are troubled that telephone company licensure under the patent laws could be used as a discriminatory and anticompetitive tool to thwart sales of competitors' equipment. Therefore we shall modify our policy, stated in paragraph 49 of the First Report and Order in Docket No. 19528, as set forth below.

8. The plug and jack designs set out in Appendix A hereto are hereby adopted as the designs for the standard plugs and jacks required by § 68.104 of our rules. These plug and jack designs may be subject to telephone company licensing only in accordance with the following conditions,[7] and no other telephone company-imposed restrictions on connection of registered terminal equipment and registered protective circuitry may be imposed:

(a) The unilateral and bilateral license agreements set out in Appendix B hereto shall be used for all patent license agreements for standard plugs and jacks.

(b) Uniform standard royalties shall be charged to all desiring licenses. The maximum royalty, under a unilateral license, shall not exceed 5% of the licensee's sales price of plugs and jacks and ¾ of 1% of the licensee's sales price for cords.[8]

(c) AT&T, its subsidiaries and affiliates, shall make available, without charge, adequate product information to assure that standard plugs, jacks and cords designed by AT&T can be produced by a competent manufacturer.

(d) On request, AT&T, shall include licenses on its worldwide (non-United States) patents which implement the claims of its United States patents, in countries other than the United States, at no additional royalties.

We believe that the foregoing strikes a reasonable balance between the public interest in standardization of technically and economically beneficial designs, and our belief that AT&T should not be able to obtain a discriminatory and anticompetitive advantage over its competitors in the supply of telephone equipment through the imposition of royalties. In addition, our Rules shall specify the use of therein-specified standard plugs, jacks and adapters "or equivalent." Thus, if an entity wishes to produce an "equivalent," it will be free to do so, subject, of course, to the patent laws.

9. GTE and AT&T each proposed (notwithstanding their assertions that vessel and vehicular telephone installations should be exempt from our plug/jack requirements) that an additional plug and jack be added to the standard plugs and jacks proposed in our Notice. Specifically, they proposed the adoption of a weatherproof, 3-position twist-type parallel voice connector for such installations, and no party objected to inclusion of such a connector as standard. Accordingly, we are adopting this plug and jack as a standard, and note that its inclusion moots many of the carriers' concerns with regard to the use of the "modular" plugs and jacks in moisture-laden and corrosive environments.

Plug/Jack Configurations

10. The specific meeting-sponsored configurations for use of the proposed 6, 8 and 50 pin standard connectors were intended to accommodate known and presently foreseeable uses of such plugs, jacks and adapters, for connection of equipment other than PBX and key telephone equipment. At the outset, it should be noted that in broadly characterizing these connectors by the maximum number of pins, we did not intend to limit deployment of connectors which physically have less than the maximum number of pins inserted, where appropriate. Thus, AT&T recommends that we substitute "positions" for "pins" in our discussion of the configurations. We shall do so.

11. In the following discussion of plug/jack configurations, we have grouped the various configurations into four categories: parallel voice connectors, parallel data connectors, series connectors, and adapters. Parallel voice and parallel data connectors are both used for the parallel connection of equipment to telephone communications channels or facilities (including connection to PBX and key telephone common equipment). However parallel data connectors incorporate the additional feature of having the jack wired to either attenuate data signals, or to limit data signals to the maximum signal power level which is permitted any particular installation. Parallel voice connectors will be used to connect telephone instruments, most forms of ancillary equipment (such as telephone answering machines and loudspeaking devices), and data equipment registered in accordance with § 68.308(a)(4)(iii) of our rules (e.g., data equipment operating in the "permissive" fixed −9 dBm output mode). Parallel data connectors will be used by data equipment registered in accordance with § 68.308(a)(4) (i) or (ii) of our rules. Series connectors will be used for the series connection of equipment such as automatic dialing devices and burglar alarm devices, as well as certain data equipment. Series jacks contain an internal mechanism which shorts certain connections when the series plug is withdrawn and thereby accomplish the Commission's requirement that such a jack be arranged so that if the plug connected thereto is withdrawn, no interference to the operation of equipment at the customer's premises which remains connected to the telephone network, shall occur by reason of such withdrawal. Finally, various adapters were proposed, both in the Notice, and in comments received thereon. We shall address each of these categories herein, and related matters raised in comments and replies in this proceeding.

12. Parallel voice connectors. As proposed in our Notice, the parallel voice connectors would be configured so as to allow parallel connection of telephone equipment both to telephone communication channels (lines and trunks) and to the common equipment of PBXs and key telephone systems. One matter which is presently before the Commission on reconsideration of its Second Report and Order in Docket No. 19528 is to what extent equipment of various suppliers shall be intermixed with PBX and key telephone common equipment, and we shall address that matter in Docket No. 19528. However, it developed at the cooperative industry-carrier meetings that where there is a simple, defined interface between the PBX or key telephone common equipment and remote station equipment (generally, in older PBX and key telephone system designs), an appropriate parallel voice connector can be used for the connection of data and ancillary equipment, and telephone instruments. In new PBX and key telephone system designs, there is considerable integration of the common equipment and the telephone instruments themselves, and thus a clearly definable set of interface parameters may no longer exist. The older key systems require that for each station line which is "picked up" (by an ap-

[6] We were informed at our meetings that the telephone companies' use of these plugs and jacks is in fact reducing the cost of providing telephone service.

[7] All of these conditions are fully in accord with representations made by AT&T in its comments herein. Our imposition of these conditions indicates our intention to hold AT&T to these representations. In addition, AT&T represented that where the standard plugs, jacks and cords are not available from other suppliers, Western Electric Company would offer these items for sale at prices equal to prices charged by Western Electric to the Bell System telephone companies. This offer was made in recognition that standard plugs, jacks and cords may not be available from any other source in the initial stages of our program, and that otherwise AT&T would gain a significant competitive advantage over other equipment manufacturers. We will require AT&T to adhere to this offer.

[8] AT&T has represented that the royalty is expected to be in the range of ½ cent to one cent per unit assuming that other manufacturers charge prices similar to those charged by the Western Electric Company for such devices. If we subsequently are apprised that royalties are disproportionate to this representation, we will reconsider our limited approval of telephone company licensing of plug and jack designs, or seek the imposition of appropriate sanctions through our own or other governmental process. Since plugs and jacks are increasingly fabricated as an integrated unit with cords, AT&T has accordingly proposed licensure of its cord patents which are relevant to the use of standard plugs, jacks and adapters.

propriate lowering of the tip-ring impedance during the "off-hook" state), a low-resistance closure of an "A/A1" pair of wires also be made, to prevent interference with the "hold" features of such equipment. Accordingly, A/A1 connections are required to be present on parallel voice connectors used with such systems. In addition, some equipment (such as data equipment used in the "permissive" —9 dBm level mode) cannot tolerate the attenuation imposed by key telephone common equipment, thus an optional arrangement is provided whereby the tip-ring connections are made on the line side of the common equipment, and the A/A1 connections are made on the station side of the common equipment.

13. Specific proposed configurations in the parallel voice category include: Bridged (paralleled) tip/ring with and without A/A1 connections on the 6 position connectors; bridged tip/ring on a newly-proposed (in the comments) 3 position weatherproof connector; bridged tip/ring for each of two lines on the 6 position connectors; and bridged tip/ring, with and without A/A1 connections for multiple-line applications on the 50 position connectors. Since there are no objections to these proposals we are adopting them, and specific implementing rules are contained in Appendix A attached hereto.

14. Parallel data connectors. Our Rules presently specify two means of connecting loop-optimized data equipment to the telephone network (as opposed to "permissive" —9 dBm fixed level equipment).[9] These are the fixed-loss loop method, whereby a maximum, standard high level for data equipment output will be uniquely attenuated in a data jack to the permissible level for each particular loop to which the jack is connected, and the programmed method, whereby programming means are inserted in the jack by the telephone carrier at the time of its installation to cause the data level output of equipment plugged into such a jack to be limited to the maximum permissible level for each particular loop to which the jack is connected. At our meetings, the interested participants agreed that the programming means used in programmed jacks shall be the installation of an appropriate resistor and its connection to two pins of the jack. Registered data equipment using the programmed technique will use this resistor's value in its circuitry to appropriately limit the data signal power.[10] These methods of connection of data equipment will be accomplished through use of various configurations of data plugs and jacks.

15. In our Notice, we proposed the use of 8 position keyed connectors to accomplish bridged tip/ring connection, with and without A/A1 connection to both telephone communications channels (lines and trunks) and PBX and key telephone common equipment, and the use of 50 position "ribbon" connectors to accomplish multiple bridged tip/ring connections, without A/A1 connections. In both cases, various combinations of the fixed-loss and programmed techniques were proposed.

16. In its comments in this proceeding, AT&T referenced its Petition for Reconsideration of our Second Report and Order in Docket No. 19528 wherein it took the position that no data equipment using the fixed-loss and programmable techniques can be installed behind customer-provided PBX and key telephone common equipment, as it would be impractical for the telephone company to install a uniquely-attenuated jack behind another supplier's equipment. Allegedly consistent with this position, AT&T proposed in its comments in this proceeding that no standard connector configurations for data which incorporate A/A1 connections be adopted, although we had proposed the same in our Notice, as submitted by the cooperative industry-carrier meetings. AT&T's position is that it would be inappropriate for it to install a programmed or attenuated jack behind another supplier's equipment. In order to comply with the approach adopted in our rules,[11] where customer-provided PBX or key telephone common equipment and associated intrasystem wiring is involved, the local telephone company would have to measure the attenuation between the dataset location and the telephone company central office, and then install a data jack to the customer's intrasystem wiring.[12] Clearly this argument does not relate to the installation of such a jack behind a telephone company-provided PBX or key telephone system.

We are not taking a position at this time as to whether, or under what conditions, the carrier should undertake the supply of and/or installation of a data jack in these circumstances; such will be dealt with in our order on reconsideration of our Second Report in Docket No. 19528. However, it is still appropriate to include data jack arrangements incorporating A/A1 leads in this proceeding to at least cover the case of connection of a dataset behind carrier-provided common equipment. For this reason, we are rejecting AT&T's proposed variation of this consensus judgment arrived at during the course of our meetings.

17. As we stated in our Notice, our staff had suggested that data jacks be mechanically compatible with standard voice plugs, to permit alternate voice/data usage of a jack (a not uncommon requirement). This suggestion was followed and a configuration of the 8 position data jack was proposed which would allow insertion of a standard 6 position voice plug in its center.[13] Pin assignments for various functions of the 8 position data plug and associated data jack were chosen such that excessive signal power cannot result if a data plug is inadvertently plugged into an 8 position jack used for voice (e.g., in a key telephone system). However, the telephone companies are already using the 8 position jack in certain key telephone systems, and in such systems if a data plug were inadvertently plugged in, service disruption or damage to the key system or the dataset could occur. For this reason, it was agreed at the meetings that the 8 position data plugs should contain convex "keying," and the 8 position data jacks should contain corresponding concave "keying." Under this approach, a data plug would be blocked from insertion into a jack that did not contain a channel corresponding to the convex "key" on the plug, but a voice plug could be inserted into a data jack. Various parties have commented that such keying is not required on a 50 position "ribbon" connector, as equipment installed using a multi-line data plug is normally installed and maintained by trained personnel, and it is unlikely that the 50 position data "ribbon" plug will be inadvertently inserted into a 50 position jack configured for voice.[14] We agree with these positions. Keying will be required on the 8 position data plugs and jacks to prevent possible service disruption and damage to equipment, and will not be required on 50 position connectors when used for data applications. We are permitting use of the 50 position connectors for single-line data installations, as well as multiple-line installations, to provide an immediately available standard means of connecting data equipment in the near future, while the keyed 8 position connectors are unavailable.

18. In summary, we are providing three methods for parallel connection of data equipment. First, data equipment operating at a nonadjustable signal power level no greater than —9 dBm may be connected to any standard (voice or data) telephone jack, with or without A/A1 connections, as desired. Second, data equipment may be connected, using the programmed method, to a keyed 8 position data jack containing a programming resistor, with or without A/A1 con-

[9] See § 68.308(a)(4) of our rules.

[10] One technique proposed for its use was to use the resistor as part of the circuitry of an attenuator which affects only the output signal level, and not the incoming signals. Some participants felt that this would permit additional optimization over the fixed-loss loop technique which attenuates incoming signals as well as outgoing signal power.

[11] See, § 68.308 of our Rules.

[12] Under § 68.308(a)(3) of our Rules, the "one port" PBX and key telephone common equipment is not permitted to have net gain. Thus, the maximum permitted data signal power level (voiceband) at the dataset termination would be somewhat higher than the signal power permitted at the interface to telephone carrier communication channel, to overcome attenuation in the common equipment and intra-system wiring. This attenuation would be unknown in any given installation unless measured.

[13] Pin assignments for tip and ring were chosen to permit such compatibility.

[14] Rixon asserted this position in its comments, and AT&T concurred in its reply. IDCMA supported Rixon's view and further indicated that "keyed" 50 position connectors are not presently available, whereas the standard, unkeyed connector is available from a multiplicity of suppliers.

nections,[15] as desired, or to a 50 position connector containing programming resistors for up to eight lines.[16] Third, data equipment may be connected, using the fixed loss loop method, to a keyed 8 position data jack containing both a programming resistor and attenuating circuitry, with or without A/A1 connections, as desired, or to a 50 position connector containing both programming resistors and attenuating circuitry for up to eight lines.

19. Series connectors. Participants at our meetings indicated that there are several types of equipment which currently use series connections to telephone company channels or facilities: pulse dialers, loop current sensing circuits (generally in datasets), and burglar alarm systems.[17] The series connector which was proposed at the meetings, and in our Notice, is a variation of the 8 position jack, for use with a standard 8 position plug, and which contains two "shorting bars," or springs, which have the effect of shorting two pairs of connections when no plug is inserted, and removing these shorts when the plug is inserted. Under the proposed configurations for the series connector (as in the case of the 8 position parallel data jacks), the series jacks are compatible with 6 position voice plugs, for some forms of alternate use. The proposed series connector is capable of use where registered equipment is placed in series with a telephone communication channel (e.g., an alarm reporting application), and where registered equipment is placed in series with a telephone company facility, such as a telephone set (e.g., where ancillary devices such as automatic dialers are used in conjunction with the dialing circuitry of a telephone instrument). The specific proposed configurations are depicted both with and without A/A1 connections, to accommodate the series connection of equipment to key telephone systems. Finally, a set of contacts is available, under one proposed configuration, for transmission of "mode indication" information which is commonly required by certain datasets.[18]

20. RPS, a manufacturer of burglar alarm equipment, argues that since the 8 position series jack can be used for most of the purposes of a 6 position parallel voice jack, we should prescribe the 8 position series jack as standard for both purposes, to avoid a multiplicity of standard jacks. Although we agree with RPS' contention that the series jack can serve substantially all voice applications, the 8 position series jack is both more complex and more costly than the 6 position parallel jack usable for the vast majority of voice applications, and the increased cost of such a jack should not be borne by the majority of users whose needs can be satisfied by the less costly jack. Also, RPS' argument was in part posited on the belief that if all voice installations are accomplished through the use of series jacks, then users would be able to purchase series-type ancillary or terminal equipment and merely plug it in to any such jack. AT&T refutes this belief by pointing out that by its own statements, RPS' burglar alarms must be interposed between the telephone line and all telephone equipment on the customer's premises for proper operation. Any one jack on the customer's premises, if it were of the series-type, would not necessarily be so interposed. Thus, even if we were to adopt RPS' proposal and prescribe the use of the series jack for all voice applications, RPS' stated goals would not necessarily be reached. For these reasons, we are rejecting RPS' proposal, and prescribing both the 6 position parallel jack, and the 8 position series jack as standard.

21. Data usage of series connectors. Datasets used with the switched telephone network may either contain circuitry within them to originate and answer telephone calls ("automatic" operation), or be used with a telephone set which is employed to originate and answer calls, and then switch the telephone connection over to the dataset ("manual" operation). Such a telephone set generally contains a switch for this purpose in one of its switchhook buttons (called an "exclusion key") which automatically reconnects the telephone line to the telephone set when the handset is placed on-hook. Since datasets are typically sensitive to equipment which might be connected to the telephone line while the dataset is in operation, this "exclusion key" is often arranged to cut off all other telephone equipment from the line when it connects the dataset to the line, to prevent such equipment from interfering with the dataset's operation. Where a telephone company-provided telephone set is used for this purpose, the dataset only needs a parallel connection to the telephone set's "exclusion key." However, if the customer wishes to use a customer-provided telephone or ancillary device with a dataset, some means must be provided to interpose the customer-provided equipment's "exclusion" feature between the telephone line and all other telephone equipment which is normally connected to that line. This would dictate the use of a series jack. However, datasets often require an electrical indication that they have been connected to the telephone line, in addition to the actual line connections received when the "exclusion key" is operated. Therefore it was proposed that such a "mode indication" signal would be provided through contacts reserved for this purpose on one of the series jack configurations. In order to leave with the telephone company the discretionary act of setting data signal power levels, where the programmed method or fixed loss loop method of connecting data equipment is employed, a parallel data connector must be installed in addition to the series connector.

22. Mode indicator. As was discussed, a "mode indicator" signal may be desired when either a customer-provided "exclusion key" function is used, or when a telephone company-provided "exclusion key" telephone is used.[19] Where such a "mode indicator" signal must be passed through a parallel data jack to a dataset, the only pins which are available are the pins which otherwise would be assigned to A/A1. We see no problem in allowing the customer to choose assigning these pins, when installation is requested, to either A/A1 or "mode indication," as datasets using these respective functions will tend to be mutually exclusive. A dataset which requires the A/A1 function to interface with a key telephone system will be of the automatic-type, while a dataset requiring the "mode indication" function will be of the manual type. In the event that a manual type dataset is used with a telephone instrument associated with a key telephone system, the customer may either forego the "mode indication" function, or the A/A1 function (if acceptable operation can result), or can have the 50 position multiple line data connector installed with both sets of connections brought out on such a connector. As we have already noted, equipment which uses the 50 position connectors will be installed by trained personnel, and a problem of compatibility such as this will adequately be handled by such personnel.

23. Adapters. As we stated in our Notice, it was agreed at the meetings that adapters will be required for various purposes. One such purpose is the facile installation of registered equipment where the customer has pre-existing non-standard jacks already installed by the telephone carrier at his premises. In such cases, it was proposed that the carriers provide adapters which would permit the connection of registered equipment with standard plugs to the non-standard existing jacks. Specifically proposed in our Notice were two such adapters: an

[15] As discussed infra, at the customer's option the connections reserved for A/A1 may be used for "mode indicator" connections where a data jack is associated with a series jack used for transfer of the telephone connection from a telephone set to a dataset through the use of a switch on the telephone set (e.g., where the telephone set is used to establish a data call).

[16] As no multiple line arrangement was proposed which incorporatd A/A1 connections, the multiple line arrangements do not incorporate such connections.

[17] These equipment types are currently in use on the telephone network, and are connected through "connecting arrangements" which are physically interposed between telephone company provided services and facilities. Since the "connecting arrangements" are telephone carrier provided, AT&T had asserted that no customer-provided equipment interfered with the carrier-provided "end-to-end" service. This assertion simply ignores the fact that even with the "connecting arrangement", customer-provided equipment was functionally interposed. If the customer-provided equipment malfunctioned in a manner which generated incorrect electrical signals, the only way the customer could restore his "end-to-end" service was to disconnect the customer-provided equipment from the "connecting arrangement." Thus, we have only followed the carriers' own course-of-conduct in setting forth a similar means for the customer to restore his service where a series connector is used.

[18] We discuss this in more detail infra.

[19] We are discussing the use of "exclusion key" and "mode indicator" functions only in terms of data equipment. However, this should not be construed as limiting the use of such functions solely to data; other uses, presently uncontemplated, may arise.

adapter between square-array four position jacks which are in some use in the Bell System and Independent telephone company areas and the standard plugs, and an adapter between twelve position jacks which are in use in the mid-West and the standard plugs.[20] In addition, it was proposed that the carriers provide a "cube tap" type of adapter which in essence converts a single standard jack into two standard jacks. It was also proposed that other adapters might be designed and manufactured by interested parties, but that the telephone carriers would not offer to supply such adapters, as they feel that by offering additional adapters they would tend to extend the use of non-standard plugs and jacks.

24. We have received various comments on the adapters which were proposed, and on additional adapters which it was felt should also be adopted as standard. GTE suggests that a fourth adapter be made available by telephone companies to accommodate pre-existing installations of a 6 pin "Teleconnector" non-standard jack which is presently in use in some telephone companies' areas. This is consistent with the above-stated rationale for such adapters, and we shall adopt it.

25. NYPIRG and Phone-Mate argue that a customer-installable "adapter" which should be adopted would be a replacement cover for preexisting connector blocks which would convert such connecting blocks to the new standard jack. By installing this "adapter", a customer might avoid incurring charges which would be associated with a visit by telephone company personnel.[21] AT&T argues that if we were to adopt this "adapter", we would abandon our Part 68 view that the telephone company is to install a jack, as installation of this "adapter" is tantamount to jack installation. Also, AT&T argues that there would be a temptation for customers to rearrange the wiring on connecting blocks to conform to the standard assignment of pins in the standard jack on the "adapter", as wiring of the screw positions on the connecting blocks varies. An unsophisticated telephone customer might well interfere with wiring on the block, or damage it, and ultimately result in a repair visit by the telephone company. This possibility, while only an unsubstantiated speculation by AT&T, does seem to undercut our fundamental conceptual treatment of installation of equipment by customers, that such installation must be easily reversible by untrained customers to permit recovery of the telephone company's service by simple and effective means—withdrawal of a plug. In addition, GTE indicates that the specific proposed "adapter" is not mechanically compatible with many connecting blocks used by the Independent telephone companies (although it apparently is compatible with the Bell System blocks), and attempted installation of such a device on certain of the blocks used by GTE would actually damage the block and disrupt service. For these reasons, we must reject the use of an "adapter" between connecting blocks and standard jacks.[22]

26. AT&T proposes, for the first time in its Reply, elimination of the provision of a "cube tap" type of adapter by the carriers,[23] on the theory that the carriers should only offer adapters to the new standard jacks, and not an adapter which expands the flexibility of usage of a standard jack (such as the "cube tap" type). While we do not quarrel with AT&T's implicit position that our rules should only specify means whereby a customer can acquire various arrangements from the telephone companies for the installation of standard jacks, it should be noted that the "cube tap" adapter was arrived at during the course of the meetings as a means whereby a customer who already had telephone instruments on his premises installed through the use of standard plugs and jacks, could acquire an additional jack at a telephone set's location for the connection of ancillary equipment such as a telephone answering device. In view of the position stated in Appendix D of our Notice to which AT&T had concurred, it is clear that AT&T had no problem with the use of a "cube-tap" type adapter in conjunction with a telephone company provided telephone set and customer-provided equipment. Yet, in its Reply, AT&T now argues that the "cube-tap" adapter is similar to a series jack in that it breaks the "end-to-end" service provided by the telephone company, and that, therefore such an adapter should only be provided by the customer.[24] We can discern no reason why a "cube-tap" type adapter cannot be provided by both telephone companies and others upon request. The telephone companies indicated at our meetings that they intended to use such devices for their own installations, and therefore they will be available to customers.

27. Various other adapters are proposed as standard. Thus, Exxon proposes the adoption of three adapters which can be interposed between a telephone company-provided telephone instrument equipped with a standard plug, and its jack, to accommodate series connection of customer-provided equipment to that telephone instrument. Such an adapter would, in Exxon's view, be customer-provided. RPS proposes that a similar series adapter be provided by the telephone carriers. We have already discussed our views as to series connections, and we find that Exxon's proposal is consistent with these views,[25] and that such an adapter should be capable of use in our program. However, we view the standards which we are adopting in the rules as relating only to those arrangements and configurations which a customer should have the right to request of his telephone company; Exxon's proposed adapters are compatible with the standard jacks we are adopting herein. A customer with equipment terminated in an interposed adapter such as Exxon proposes could install it using the plugs and jacks already specified under these rules, and therefore we find it unnecessary to adopt these adapters as standard.

28. With regard to RPS' proposal that the telephone carriers be required to provide an interposed series adapter, we would note that our discussion of the operation of RPS equipment in paragraph 20, above, is equally applicable here. That is, RPS has asserted that for its burglar alarm equipment to properly operate, it must have the capability of cutting all of the customer's telephones off the telephone line while the burglar alarm is dialing, so that a burglar cannot interfere with the dialing by lifting a telephone handset. Thus, such an adapter would have to be in series with all telephone instruments at the customer's premises. An interposed adapter would only so operate if a single telephone instrument were connected (through standard plugs and jacks) to the customer's telephone line. Therefore, in view of the fact that the adapter will not properly operate on all telephone installations, and in view of the certain proper operation of the alternative series jack which will be available, and which will be installed in the proper electrical position with respect to other telephone equipment on the customer's line, we feel that if there is to be dispute about the proper operation of RPS' burglar alarm equipment when used with an interposed adapter, rather than a series jack, such dispute should be between RPS and its customer, and should not involve a telephone company. For this reason, we will

[20] In both cases, the conversion would be to the standard parallel 6 position voice jack.

[21] While the telephone companies are now several years into a program to convert all installations to standard plugs and jacks, a large number of pre-existing telephone set installations are in service with the connections accomplished through the use of screws on connecting blocks under which are placed wires and connecting lugs.

[22] We do so with some reluctance. This "adapter" would permit the telephone consumer to avoid incurring charges for the installation of a standard jack. Moreover, notwithstanding the carriers' allegations, we are informed that in Canada, where the Canadian Government has adopted an equipment registration program somewhat similar to our own, this "adapter" is standard. However, as more installations are converted to the use of standard plugs and jacks, as part of the telephone companies' on-going program to do so (during repair and installation operations), this problem will tend to disappear. Our disposition of this request is without prejudice to our later consideration of this matter.

[23] This late-date variance of the consensus judgments of the meeting attendees (including AT&T) was not subject to notice, nor are comments permitted on it under the procedures of this proceeding.

[24] The Notice stated: "Adapter is always provided by the telephone company when one or both miniature jacks are used for telephone company equipment. Adapter may be furnished by the telephone company or the customer when both miniature jacks are used for registered CPE [customer-provided equipment]." AT&T has clearly abandoned this position in that it is now proposing that only a customer-provided adapter is appropriate where one jack is used for customer-provided equipment.

[25] That is, the customer can restore his telephone service, in the event of an equipment malfunction, by removing the interposed adapter.

not impose the requirement that telephone companies provide such an adapter.

EXEMPTIONS TO THE STANDARD PLUG AND JACK REQUIREMENT

29. No party, in comments in this proceeding or in Docket No. 19528, has objected to our fundamental premise that untrained telephone users are capable of installing equipment by inserting standard plugs into standard jacks without adverse effect. Thus we reaffirm our conclusion in Docket No. 19528 that standard plugs and jacks shall generally be the means of connection for all equipment other than PBX and key telephone equipment.[26]

30. AT&T, GTE, Continental and USITA have each asserted that, notwithstanding the general applicability of the plug/jack requirement, there are numerous situations involving telephone company-provided equipment, where this requirement is inappropriate. Among the situations identified are installations in explosive atmospheres, fire and police call boxes, outdoor locations, elevators, hospitals, telephones on parked or moored vehicles, installations in corrosive atmospheres, lifeline service, panel telephones, "terminal equipment of a critical function that the customer requests to be hard-wired for purposes of safety or necessity," and locations subject to equipment theft such as prisons, hotel/motel rooms, apartment lobbies, auto service stations, restaurants, and other "similar places where telephones are needed in the conduct of the business, but nonetheless must be located within reach of the public which the business serves." Thus the telephone companies would have us establish a multitude of general exemptions to our standard plug and jack requirement, which exemptions would run solely to telephone company-provided equipment.

31. The comments that are before us merely enumerate situations where it is alleged the standard plug and jack requirement is inappropriate. However, except as noted in paragraph 32 below, these comments do not provide any reasonable basis for us to establish exemptions to the standard plug and jack requirement. There has been no showing that the proposed plugs and jacks are not sufficiently safe and secure for these special applications. Furthermore, some of the proposed exemption categories are so vague as to undermine our desire to standardize connection of equipment through standard plugs and jacks. In addition, several of the request exemptions are addressed to situations involving the potential theft of telephones. We note that installation of a mechanical restraint (such as a simple loop around the cord which is smaller than the plug) would deter theft to the same extent as hard-wiring, while still allowing the use of a standard plug and jack and compliance with the "easy and immediate disconnection" requirement of Section 68.104 of our Rules.

32. Since customer installation of equipment in "hazardous" locations is already authorized under our tariffs, we will exempt equipment used in "hazardous" locations from our plug and jack requirements. Such equipment may be customer-provided as well as telephone company-provided, and may be installed by either.[27]

33. In view of the absence of comments fully addressing the need for exemptions to the standard plug and jack requirement, we will establish no exemptions, except as noted in paragraph 32 above, to this requirement at the present time. Telephone companies and others are free, however, to file properly supported petitions for rulemaking requesting the establishment of appropriate exemptions to the standard plug and jack requirement. We are serving notice to the carriers that we are unpersuaded that any exemptions which may be established should not apply equally to carrier-provided and customer-provided equipment.

CONCLUSION

34. In conclusion, we are adopting the plug/jack designs set out in Appendix A hereto, subject to the conditions set out in paragraph 8 above. Further, we are adopting the plug/jack configurations set out in Appendix A hereto. Lastly we are not, at the present time, adopting any general exemptions to the standard plug and jack requirement.

35. *Accordingly, it is ordered,* pursuant to Sections 4(i), 4(j), 201–205, 208, 215, 218, 313, 314, 403, 404, and 602 of the Communications Act of 1934, as amended, that Part 68 of the Commission's rules and regulations, 47 CFR Part 68, is hereby amended in accordance with Appendix A to this Order, effective July 12, 1976.[28]

36. *It is further ordered,* That this proceeding is hereby terminated.

(Secs. 4, 201–205, 208, 215, 218, 313, 314, 403, 404, 602, 48 Stat., as amended, 1066, 1070, 1072, 1073, 1076, 1077, 1087, 1094, 1102; 47 U.S.C. 154, 201–205, 208, 215, 218, 313, 403, 404, 602.)

Adopted: June 29, 1976.

Released: July 12, 1976.

FEDERAL COMMUNICATIONS COMMISSION,[29]
VINCENT J. MULLINS,
Secretary.

The Commission's Rules and Regulations (Chapter I of Title 47 of the Code of Federal Regulations) are amended as follows:

Section 68.104, headnote and text, are amended to read as follows:

§ 68.104 Means of connection.

(a) *General.* Except for telephone company-provided ringers and except as provided in subsection (c), all connections to the telephone network shall be made through the standard plugs and standard telephone company-provided jacks, or equivalent, described in Subpart F, in such a manner as to allow for easy and immediate disconnection of the terminal equipment. Standard jacks shall be so arranged that, if the plug connected thereto is withdrawn, no interference to the operation of equipment at the customer's premises which remains connected to the telephone network, shall occur by reason of such withdrawal.

(b) *Data Equipment.* Where a customer desires to connect data equipment which has been registered in accordance with § 68.308(a)(4) (i) or (ii), he shall notify the telephone company of each telephone line to which he intends to connect such equipment. The telephone company, after determining the attenuation of each such telephone line between the interface and the telephone company central office, will make such connections as are necessary in each standard data jack which it will install, so as to allow the maximum signal power delivered by such data equipment to the telephone company central office to reach but not exceed the maximum allowable signal power permitted at the telephone company central office.

(c) [Reserved]

Section 68.308(a)(4) (i) and (ii) is amended as follows:

§ 68.308 Signal power limitations.

(a) * * *

(4) * * *

(i) A maximum level adjustable to no greater than −4 dB with respect to one milliwatt, for connection to a telephone company provided data jack. (Fixed loss loop method.)

(ii) A maximum level set by means of connection in a telephone company-provided data jack, which level can be programmed in 1 dB steps from −12 dB to −3 dB with respect to one milliwatt. (Programmed method.)

* * * * *

A new Subpart F is added as follows:

Subpart F—Connectors

§ 68.500 Specifications.

(a) Miniature 6-position plug:

[26] Where it can be demonstrated that the application of this principle will cause hardship to a telephone company, we will entertain a request for a waiver, in accordance with Mebane Home Telephone Co., 53 F.C.C. 2d 473 (1975). Moreover, where standard jacks are not available during the transition period (ending January 1, 1977), equipment may be connected through alternative means. For detailed explanation, see Memorandum Opinion and Order in Docket No. 19528, FCC 76-377 (released April 28, 1976), para. 13.

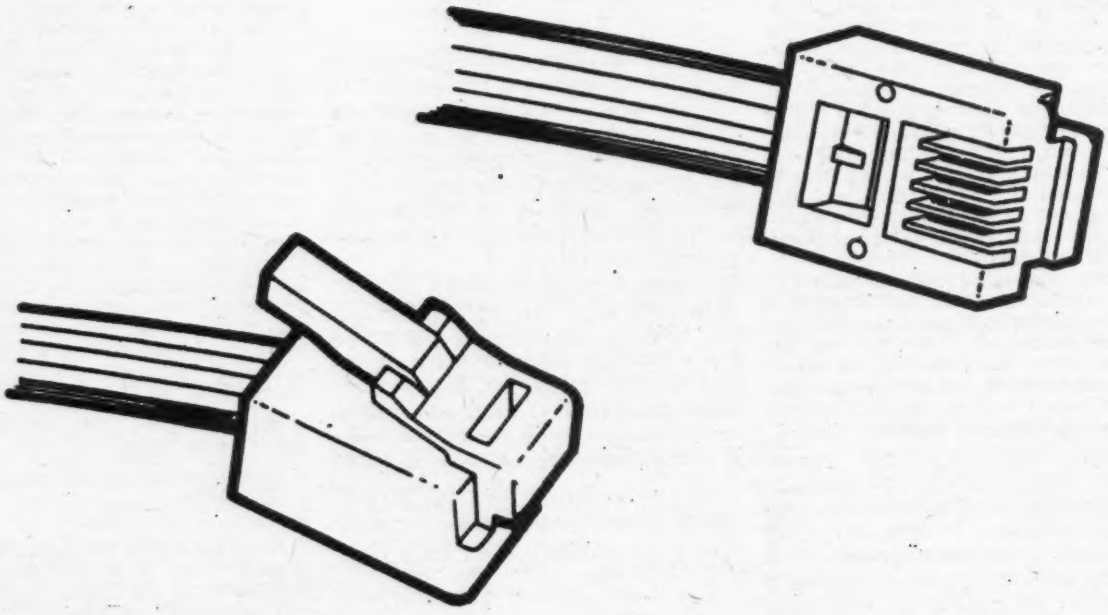
[27] See AT&T Tariff F.C.C. No. 263, Section 2.7.8.

[28] Since our registration program is already effective for customer-provided data and ancillary equipment, and the program requires the use of standard plugs and jacks for connecting such equipment, we are making these rules effective immediately upon their release. In our Notice herein, we solicited comments on why we should not make these rules effective immediately, and no party filed objections to such action. Further, since no party will be adversely affected, we believe the public interest will best be served by the immediate implementation of these rules.

[29] Commissioner Hooks dissenting.

APPENDIX A-2

Figure 68.500(a)(1)--View



(Note: This plug is depicted equipped with 4 contacts; it may be fabricated with its full 6 contact capability.)

APPENDIX A-3

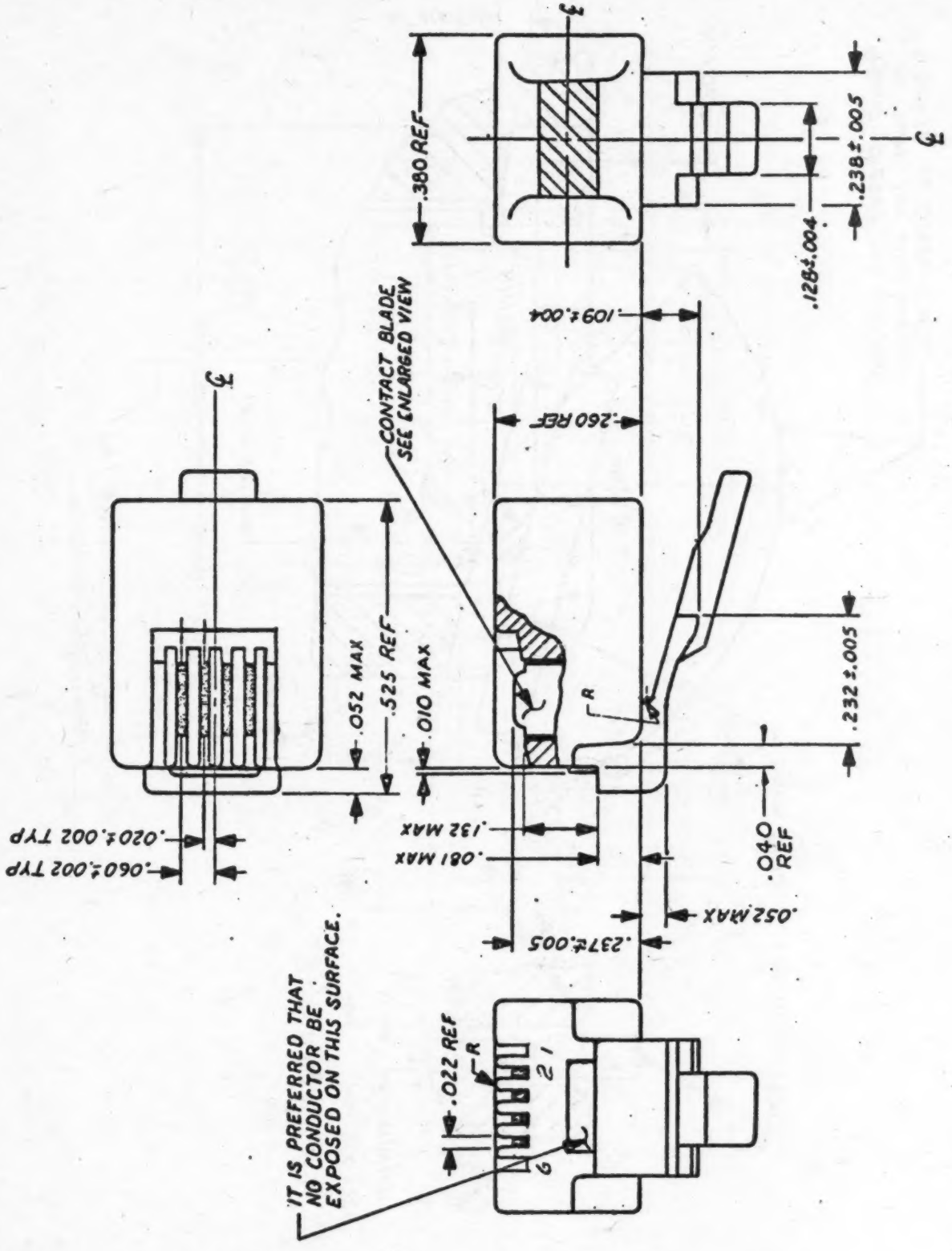


Figure 68.500(a)(2)--6 Position Plug
Mechanical Specification

APPENDIX A-4

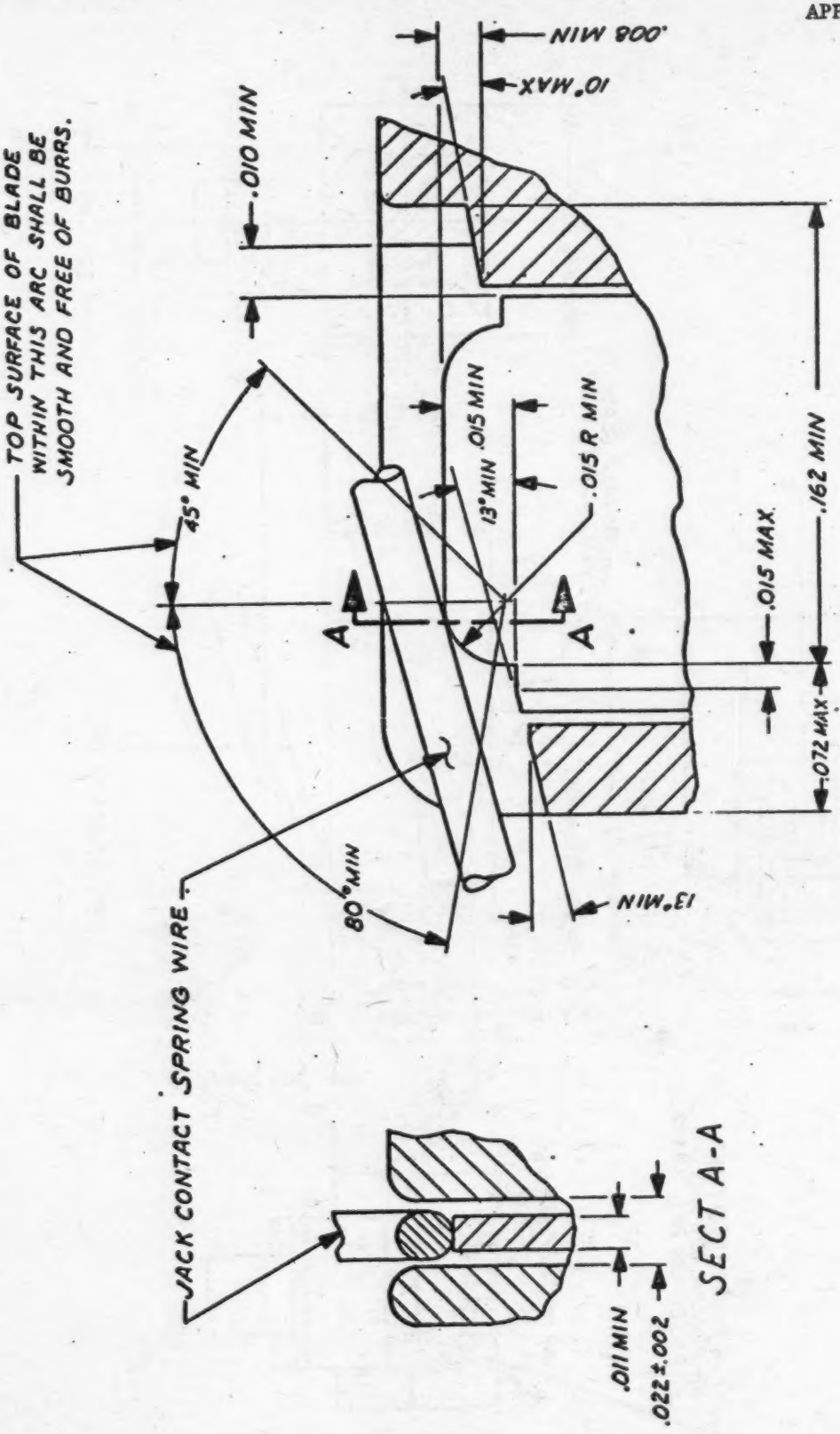


Figure 68.500(a)(3)--6 Position Plug Contact Specification

APPENDIX A-5

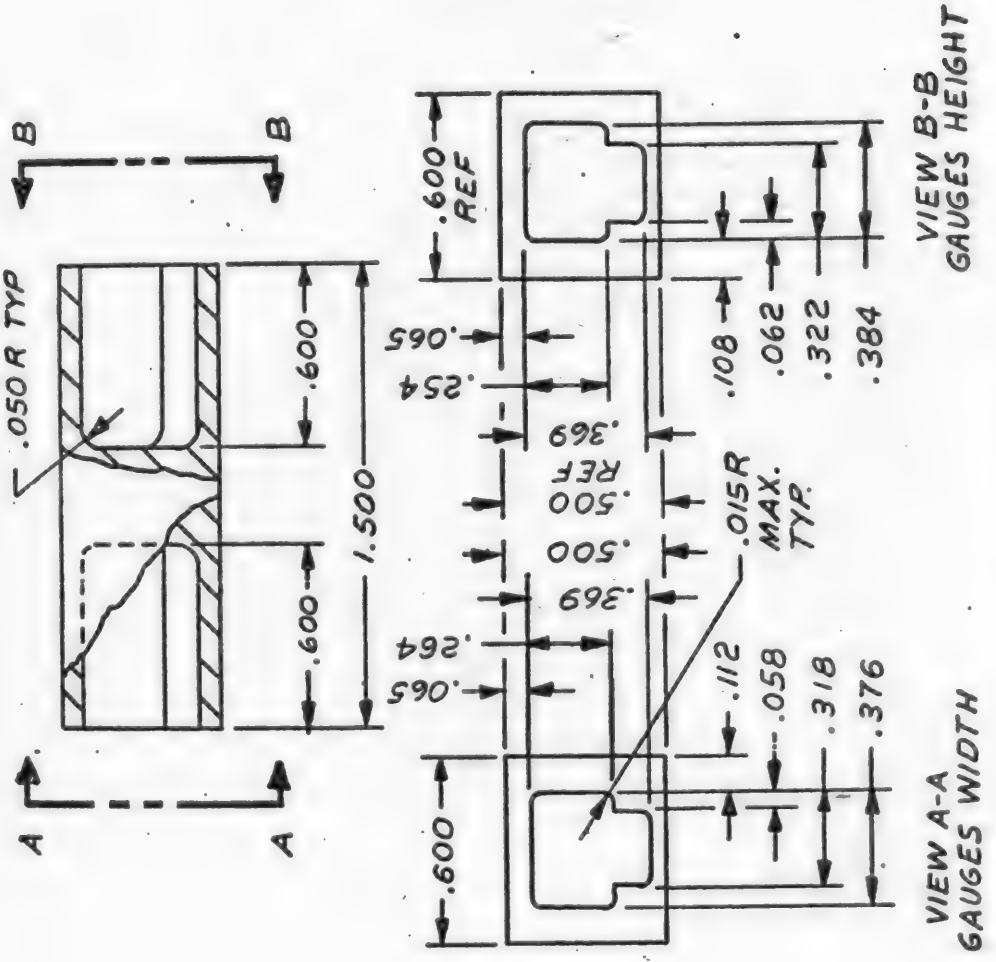
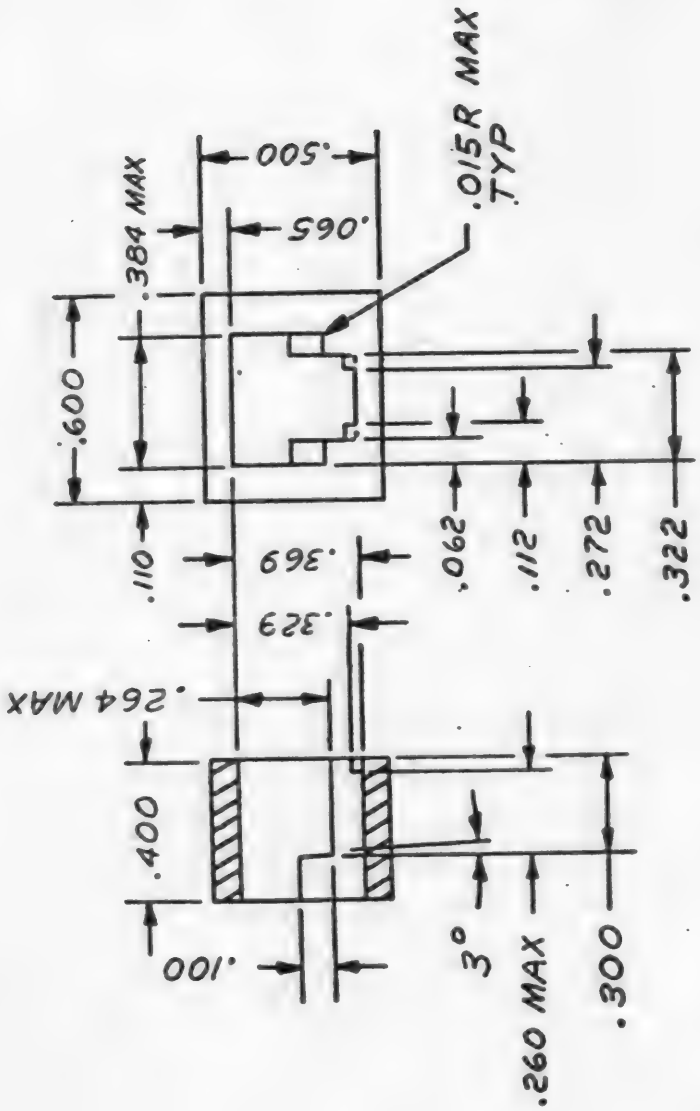


Figure 68.500(a)(4)--6 Position Plug Clearance Specification

APPENDIX A-6



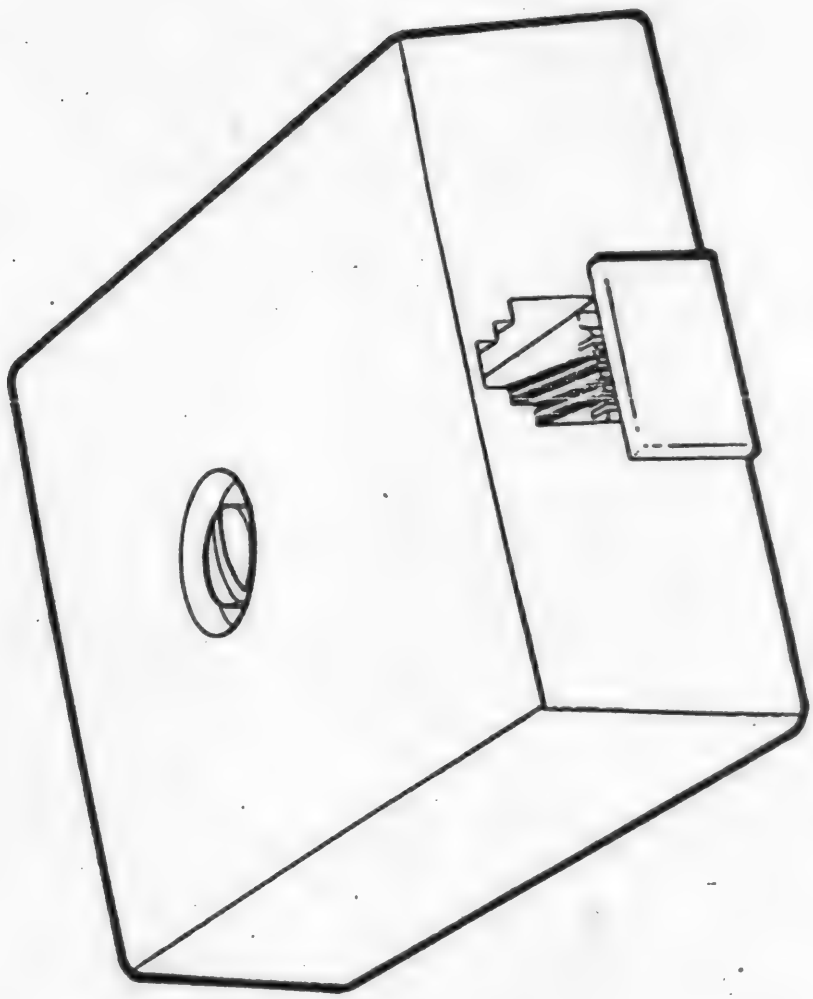
MAXIMUM CLEARANCE GAUGE

Figure 68.500(a)(5)--6 Position Plug
Clearance Specification

APPENDIX A-7

(b) Miniature 6-position jack:

Figure 68.500(b)(1)--View



(Note: This jack is depicted equipped with 4 contacts; it may be fabricated with its full 6 contact capability.)

APPENDIX A-8

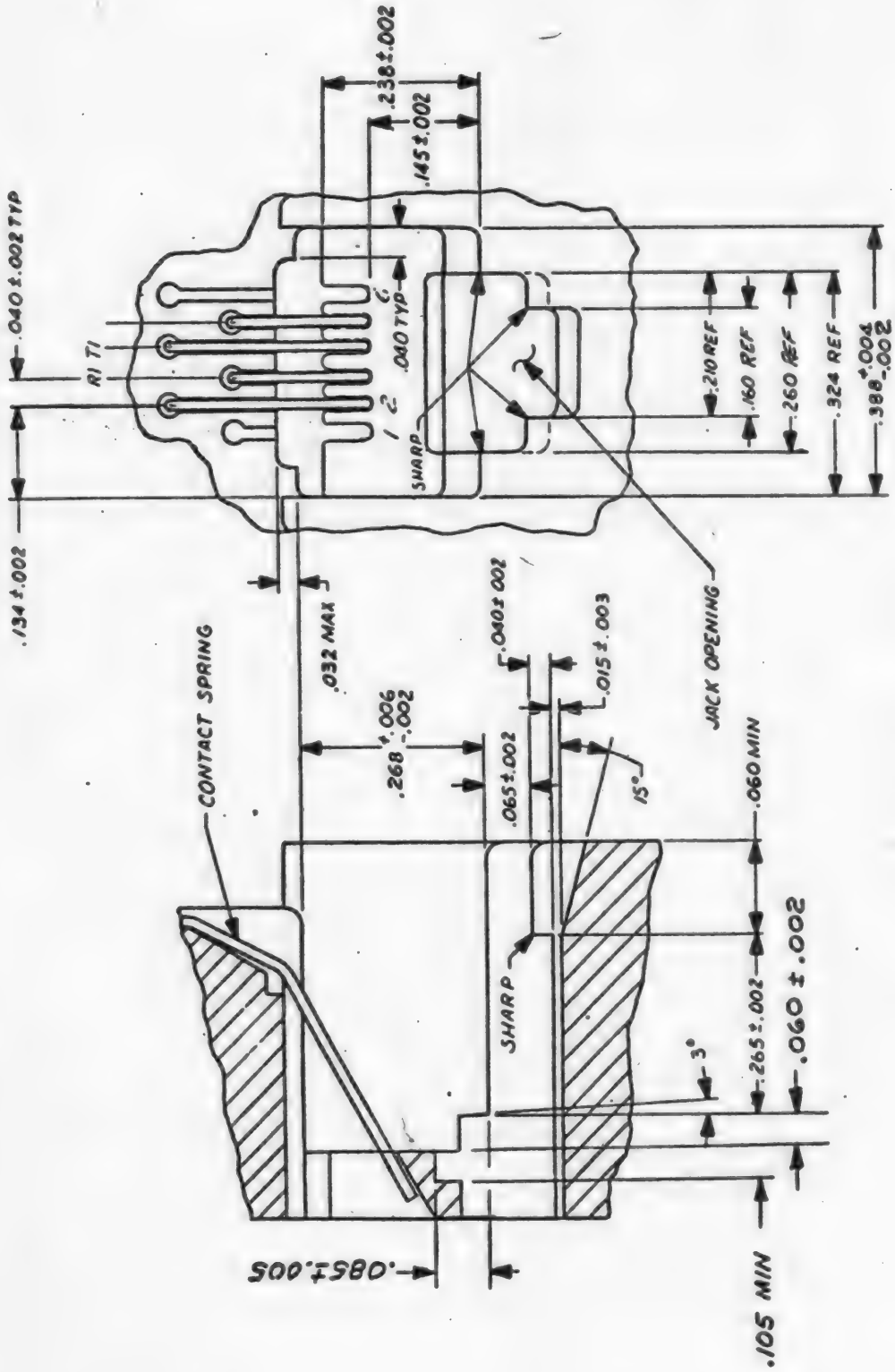


Figure 68.500(b)(2)--6 Position Jack
Mechanical Specification

NOTES:

1. THE JACK SHALL BE CAPABLE OF ACCEPTING A 0.386 INCH BY 0.266 INCH GAGE WITH 2 POUNDS OR LESS INSERTION FORCE.

2. THE JACK SHALL NOT ACCEPT A 0.392 INCH BY 0.254 INCH GAGE OR A 0.275 INCH BY 0.376 INCH GAGE WITH 1.0 TO 2.0 POUNDS INSERTION FORCE.

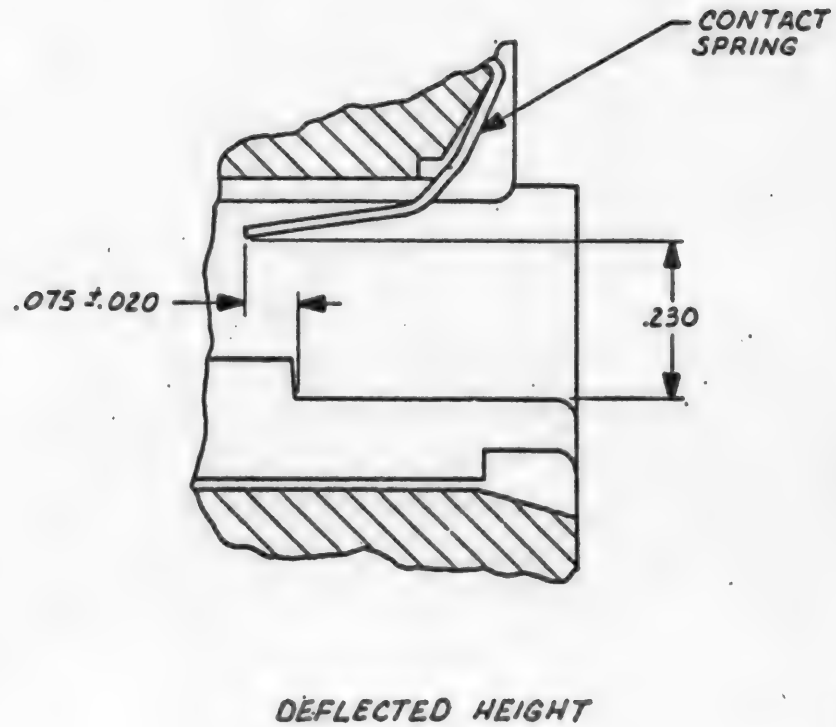
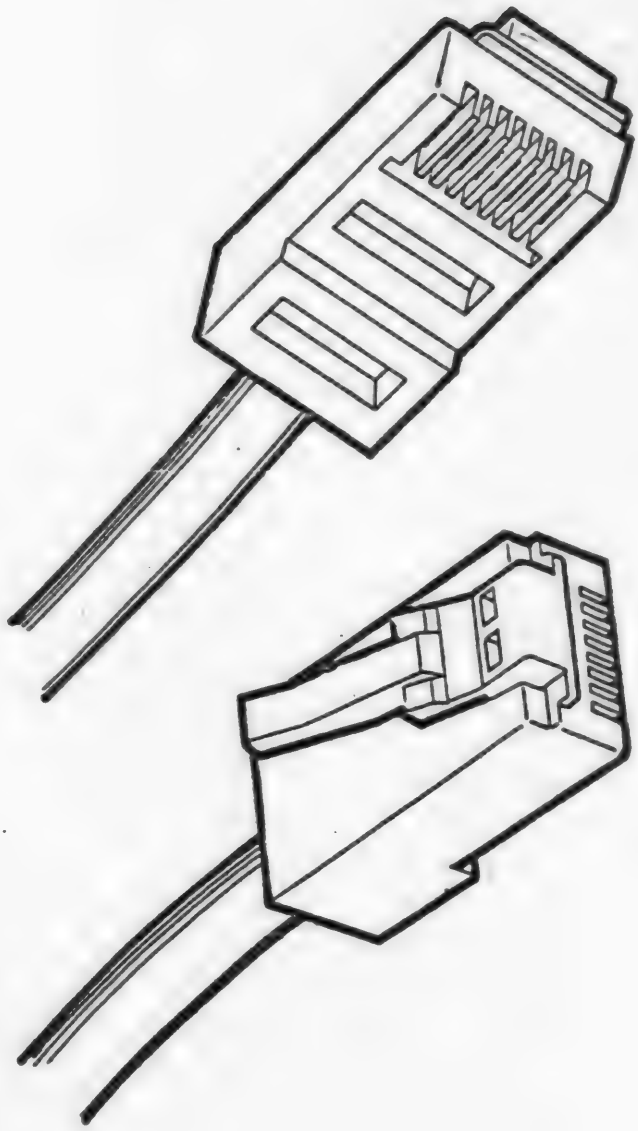


Figure 68.500(b)(3)--6 Position Jack Contact Specification

APPENDIX A-10

(c) Miniature 8-position plug, unkeyed:

Figure 68.500(c)(1)--View



APPENDIX A-11

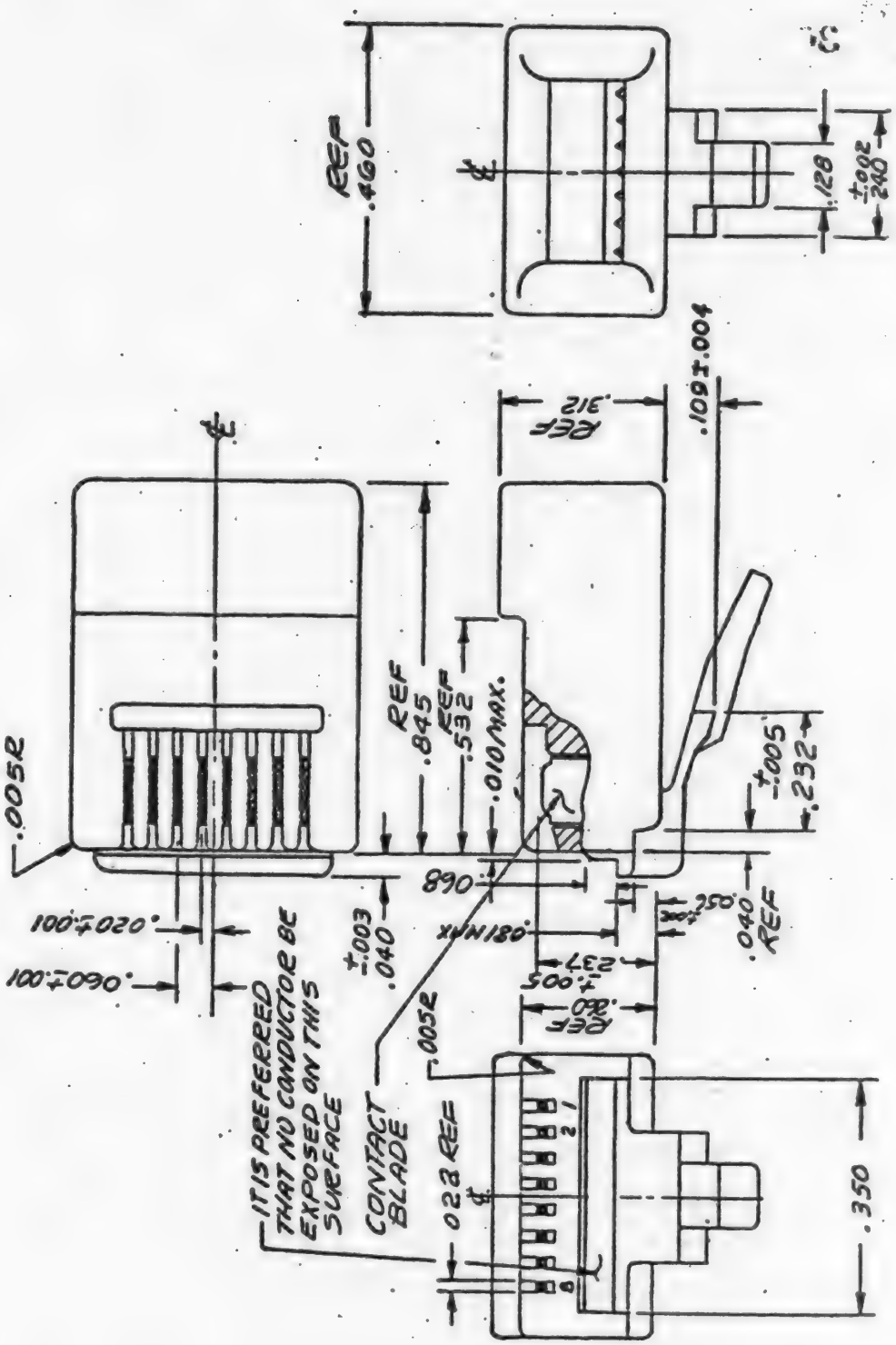


Figure 68.500(c)(2)--8 Position Unkeyed Plug, Mechanical Specification

APPENDIX A-12

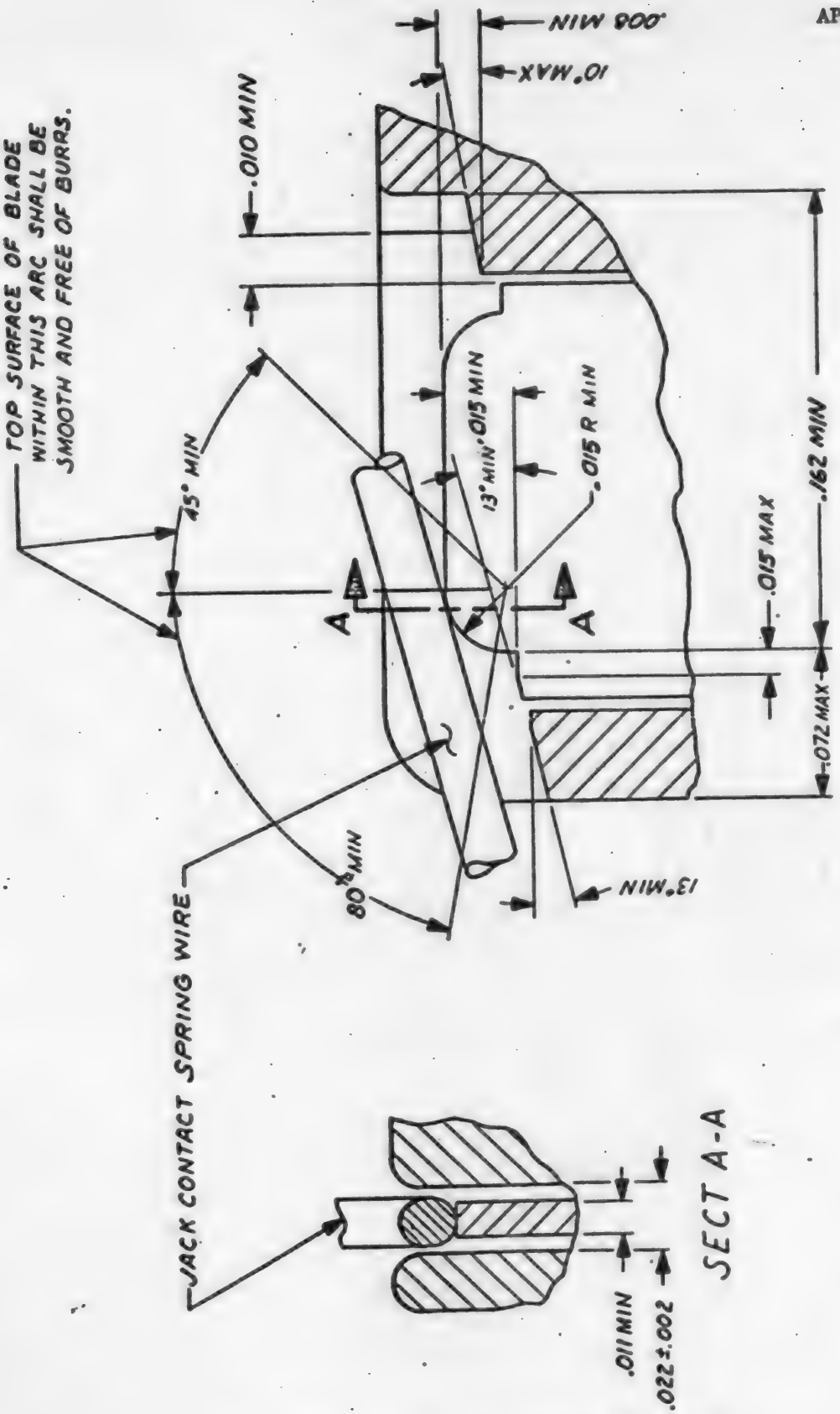
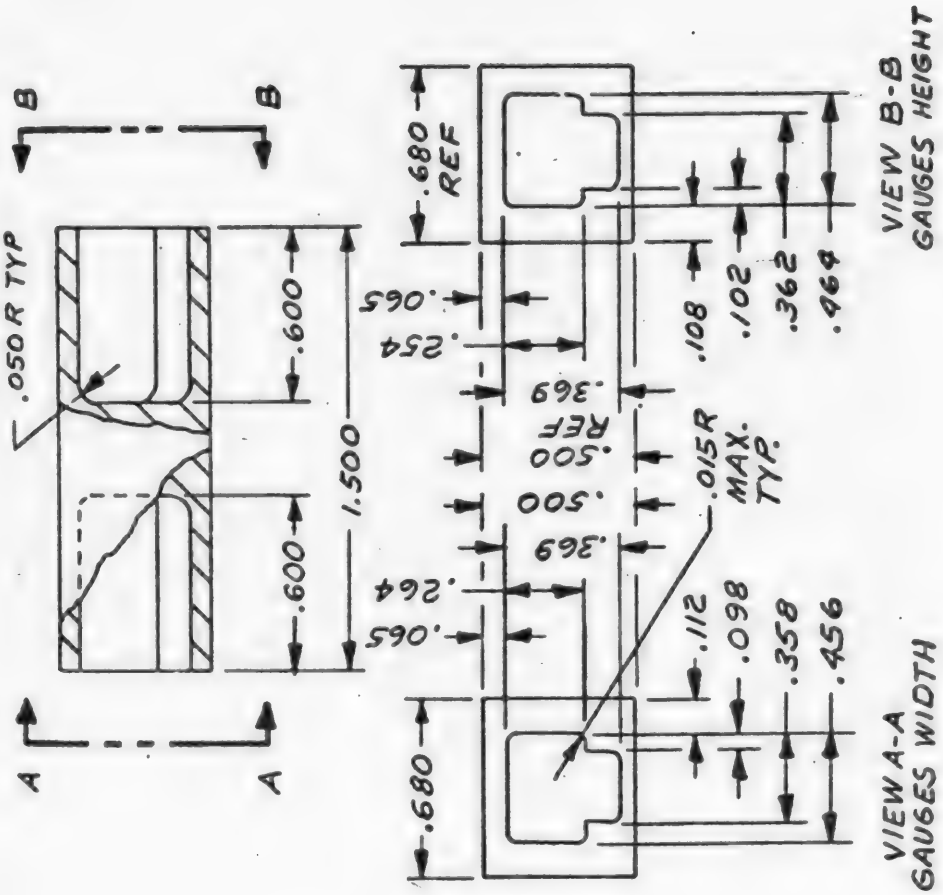


Figure 68.500(c)(3)--8 Position Unkeyed Plug, Contact Specification

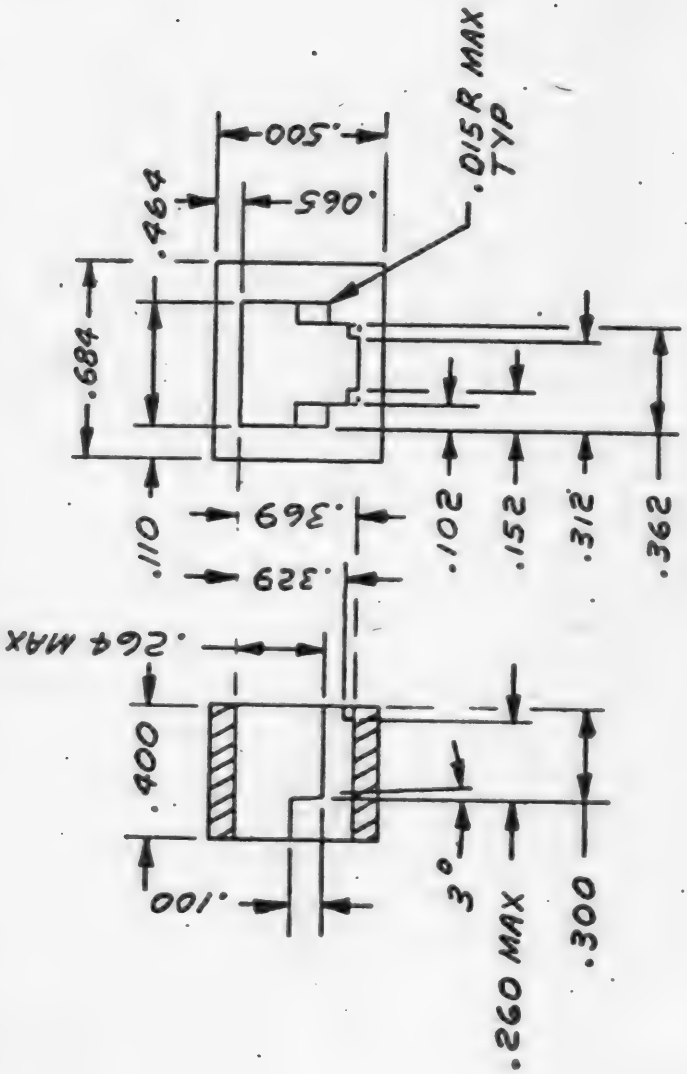
APPENDIX A-13



MINIMUM CLEARANCE GAUGE

Figure 68.500(c)(4)--8 Position Unkeyed Plug, Clearance Specification

APPENDIX A-14



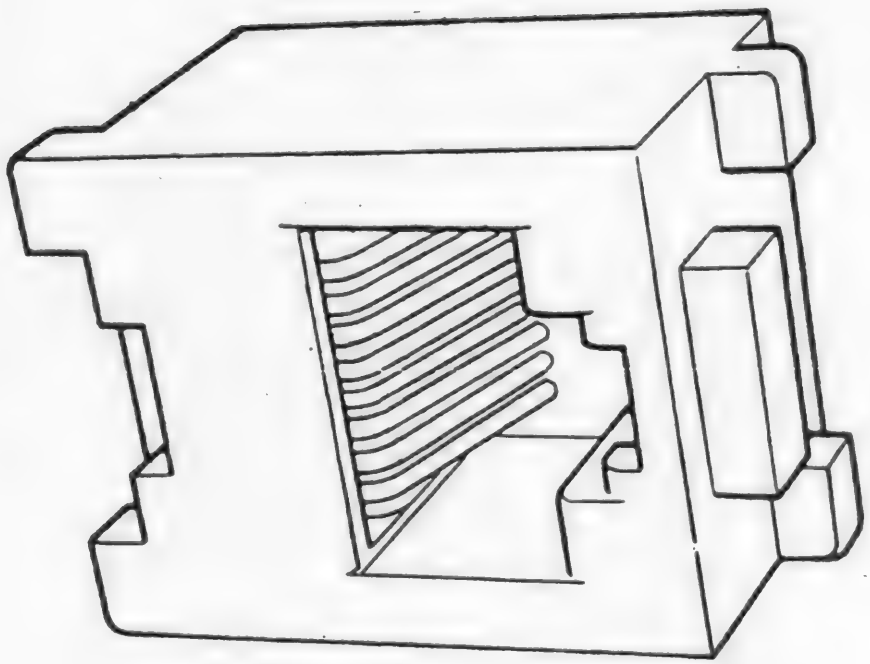
MAXIMUM CLEARANCE GAUGE

Figure 68.500(c)(5)--8 Position Unkeyed Plug, Clearance Specification

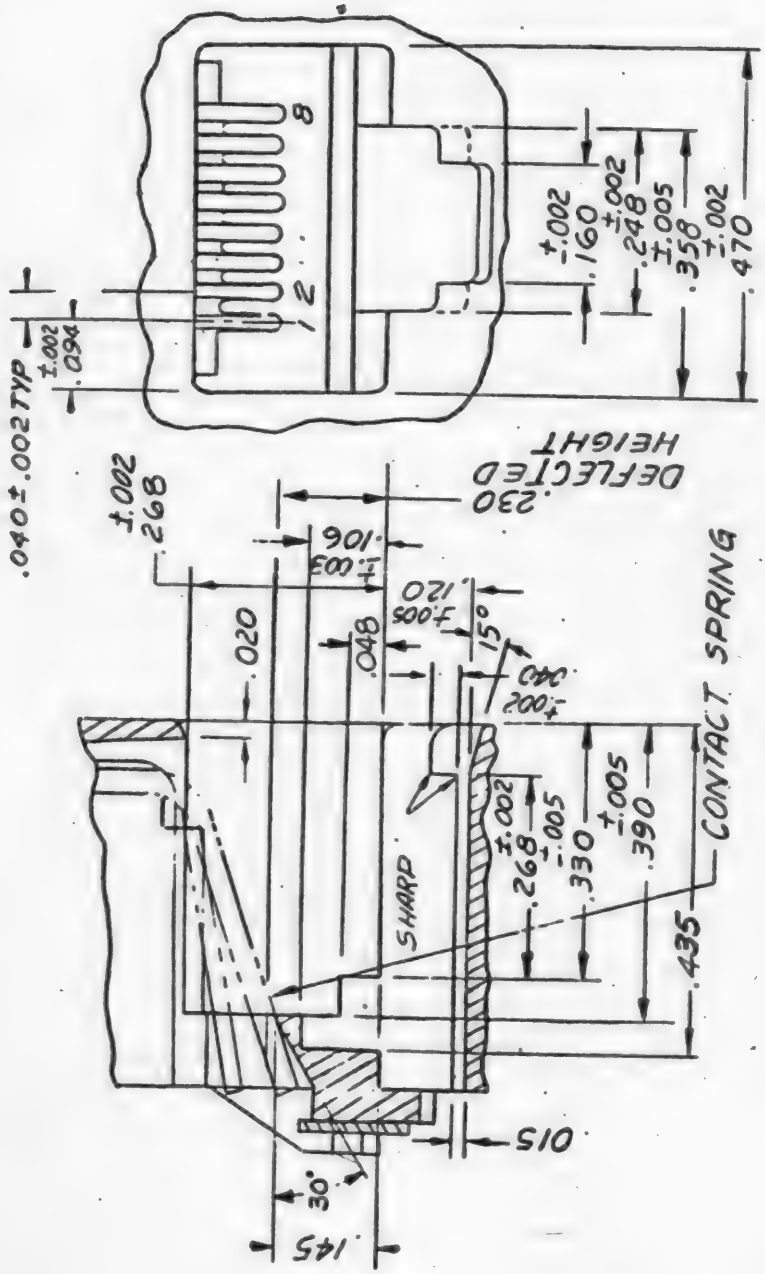
APPENDIX A-15

(d) Miniature 8-position series jack:

Figure 68.500(d)(1)--View



APPENDIX A-16



IN THE NORMAL MODE, CONDUCTORS 1 TO 4 AND 5 TO 8 IN THE JACK ARE BRIDGED. WHEN A MINIATURE 8 POSITION PLUG IS INSERTED INTO THE JACK, THE BRIDGE IS LIFTED OFF THESE CONDUCTORS AND A SERIES CONNECTION CAN BE MADE IN BOTH SIDES OF THE LINE.

Figure 68.500(d)(2)--8 Position Series Jack, Mechanical Specification

APPENDIX A-17

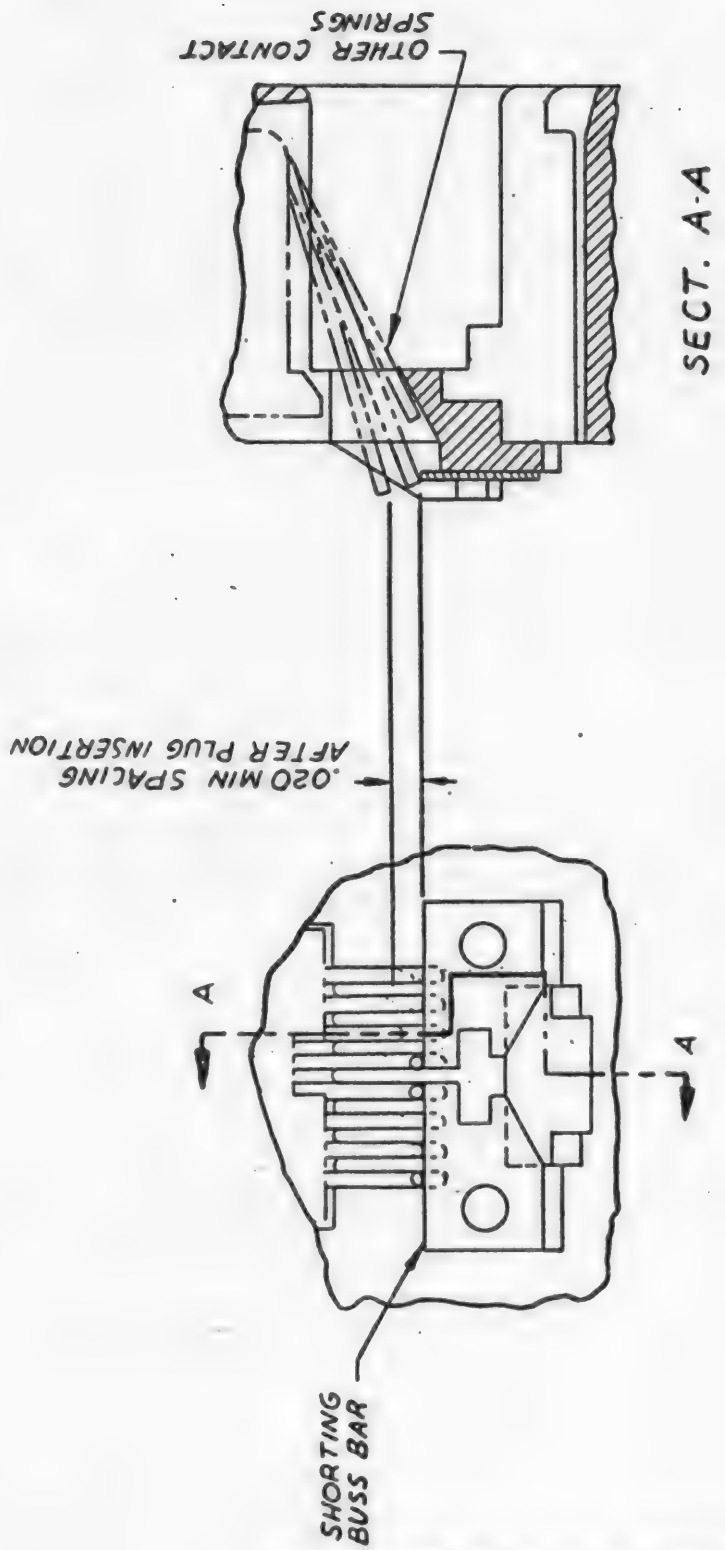


Figure 68.500(d)(3)--8 Position Series Jack, Contact Specification

APPENDIX A-18

(e) 50-position miniature ribbon plug:

(1) Contact finish in the region of contact shall be gold, 0.000030 inch minimum thickness, electrodeposited hard gold preferred 1/.

(2) "Datum B" is the center line of contact cavities.

(3) The center line of each contact shall be located within 0.009 inch of true position with respect to "Datum B" 1/.

(4) Contact width at region of contact shall be 0.045 ± 0.002 inch 1/.

(5) Center line of shell dimension indicated shall be within 0.005 inch of "Datum B" 1/.

(6) Center line of barrier dimension indicated shall be within 0.005 inch of "Datum B" 1/.

(7) "Surface X" shall have a 4 microinch finish or better; finishing shall be done in the direction of the arrow 2/.

(8) A force of not more than 40 pounds shall be sufficient to fully insert the plug onto the sizing guage shown on Figure 68.500(e)(1). The plug is fully inserted when "Surface A" of the plug 1/ touches "Surface A" of the sizing guage.

(9) After one insertion of the plug on the sizing guage, Figure 68.500(e)(2), a force of not more than 10 pounds shall be sufficient to fully insert the plug on the continuity guage shown in Figure 68.500(e)(3). The plug is fully inserted on the continuity guage when "Surface A" of the plug 1/ touches "Surface A" of the continuity guage.

(10) When the plug is fully inserted on the continuity guage, Figure 68.500(e)(3), after having been inserted once on the sizing guage, Figure 68.500(e)(2), all contacts of the plug shall electrically contact the continuity guage as determined by an electrical continuity test which applies an open circuit voltage of not more than 10 volts, and will not indicate continuity if the resistance of the circuit being checked is more than 200 ohms.

1/ Figure 68.500(e)(1).

2/ Figures 68.500(e)(2) and (e)(3).

APPENDIX A-19

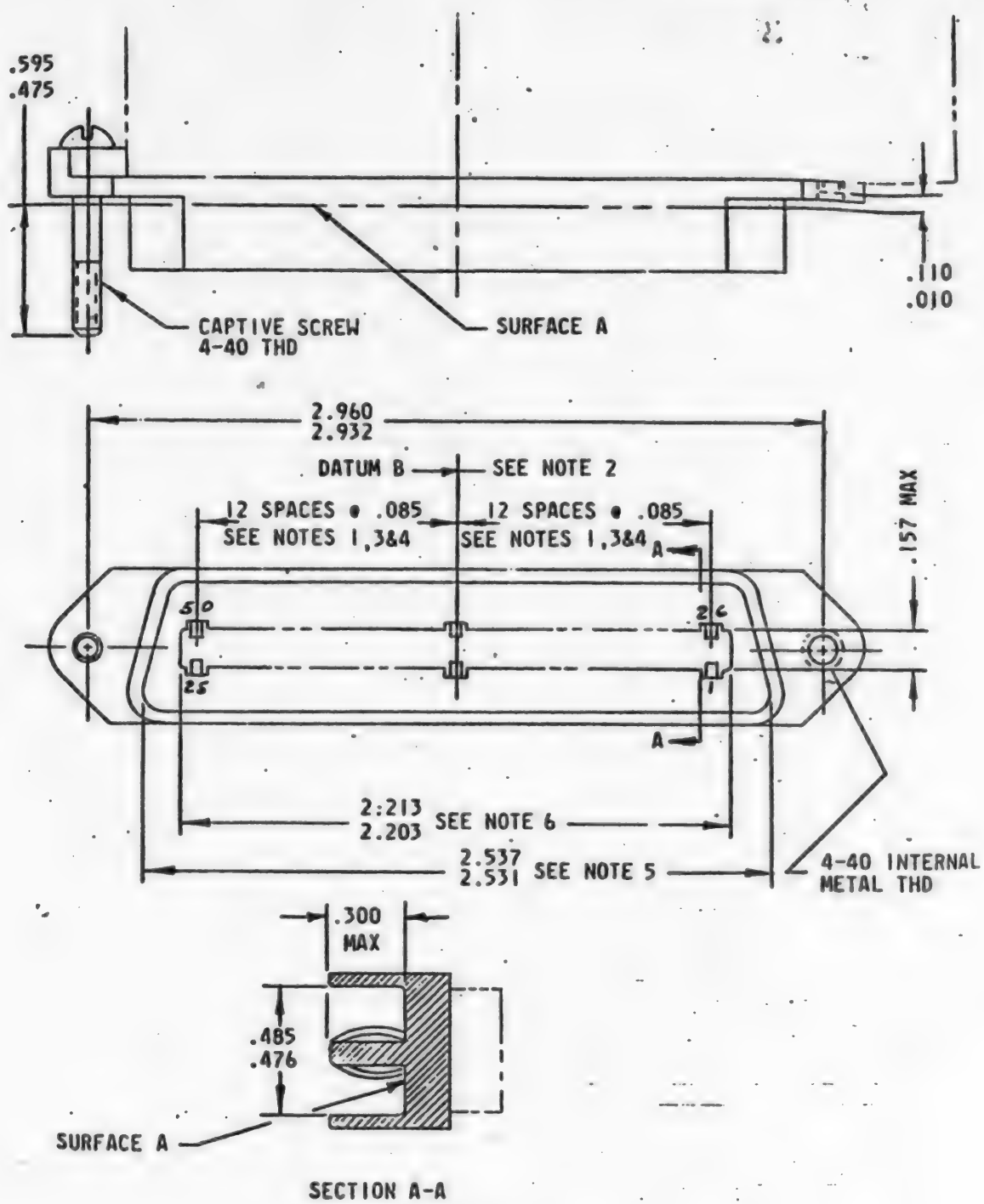


Figure 68.500(e)(1)--50 Position
Miniature Ribbon Plug

APPENDIX A-20

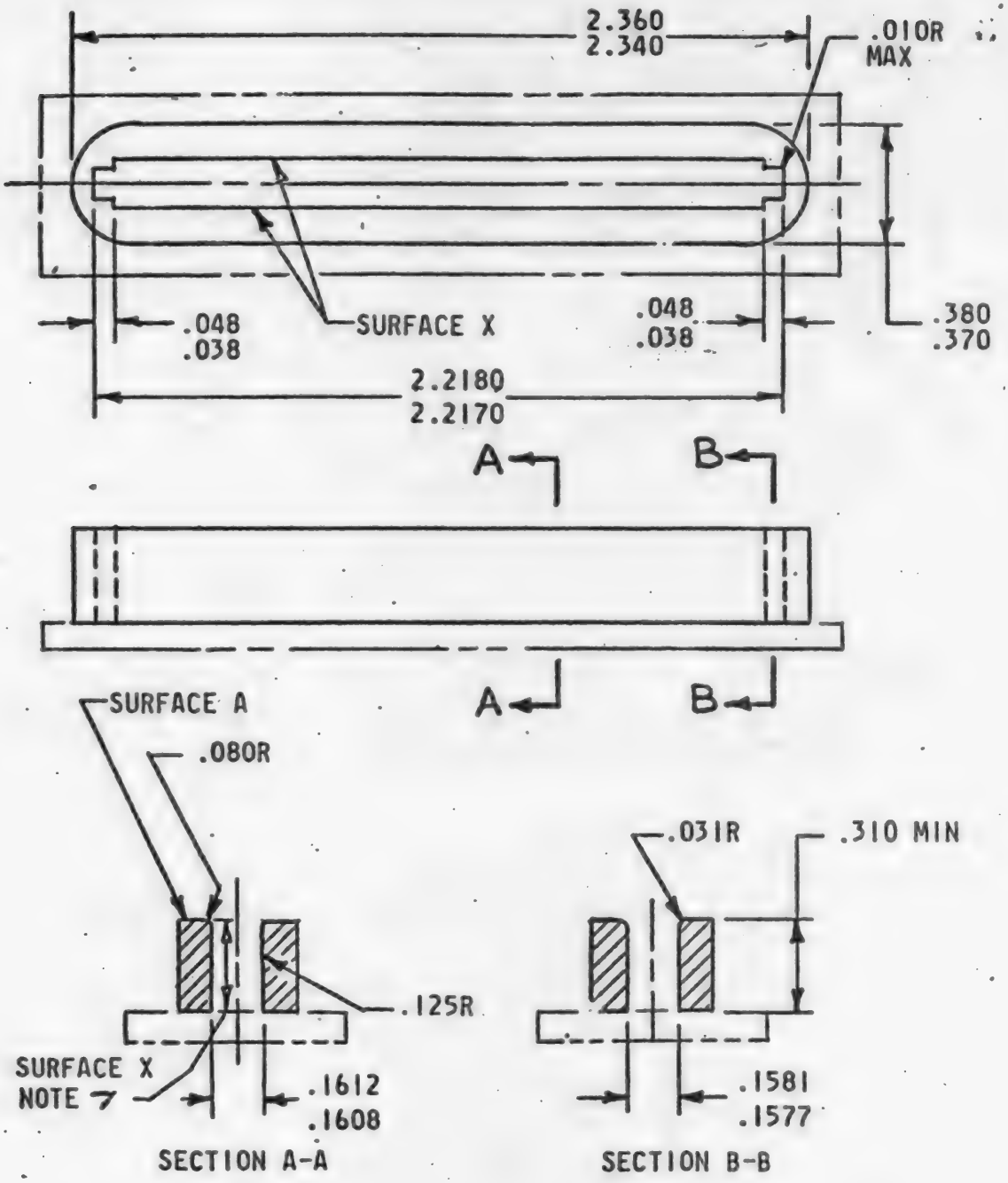


Figure 68.500(e)(2)--50 Position Miniature Ribbon Plug Sizing Guage

APPENDIX A-21

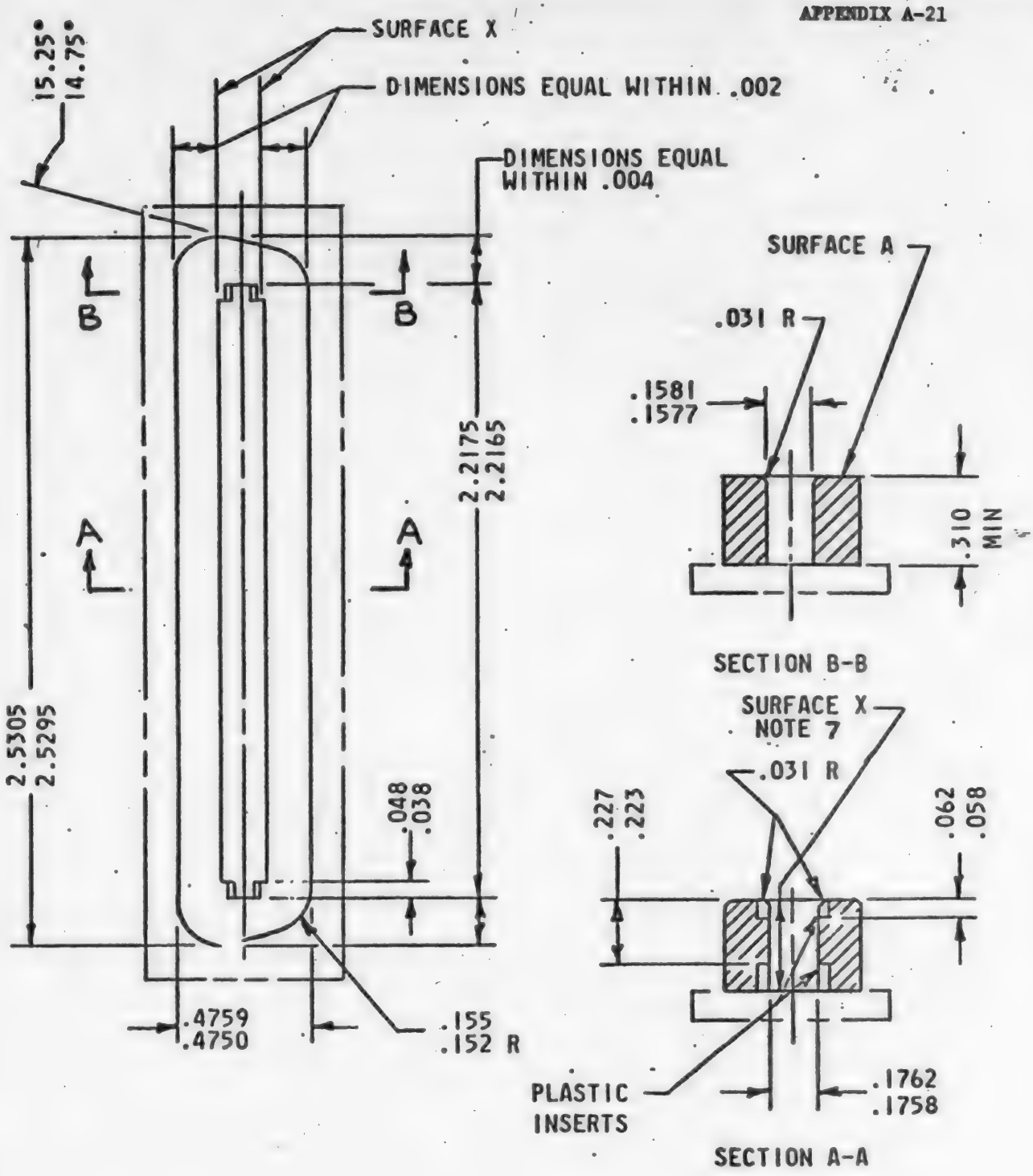
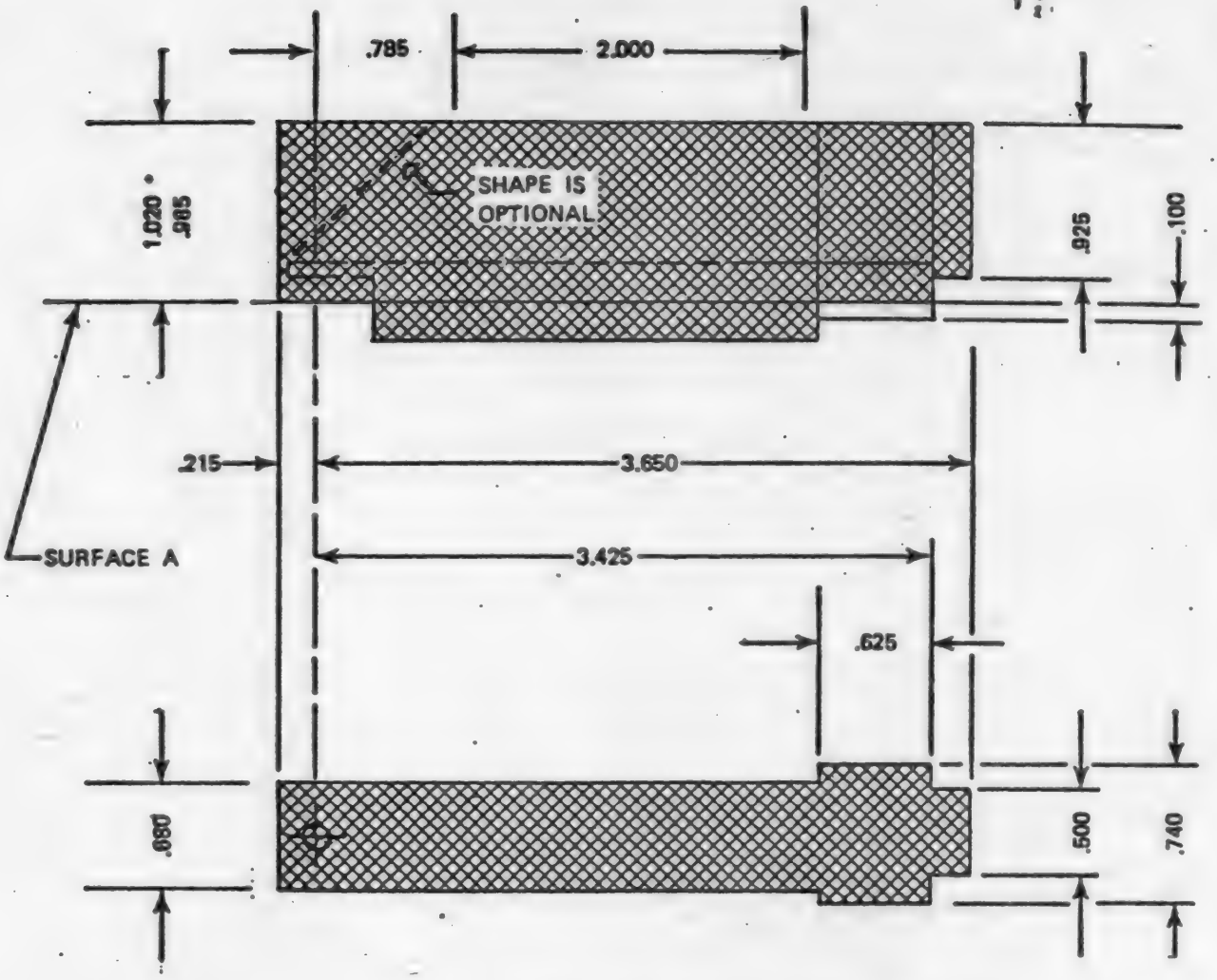


Figure 68.500(e)(3)--50 Position
Miniature Ribbon Plug
Continuity Guage

APPENDIX A-22



PLUG AND HOOD SHALL FIT IN AN ENVELOPE DEFINED BY THE CROSS-HATCHED AREA.

* THE 1.020 MAX DIMENSION APPLIES FOR THE ENTIRE HOOD LENGTH. THE .985 DIMENSION APPLIES TO THE 2.000 SECTION OF THE HOOD.

Figure 68.500(e)(4)

50-POSITION MINIATURE RIBBON PLUG – HOOD ENVELOPE

APPENDIX A-23

(f) 50-position miniature ribbon jack:

(1) Contact finish in the region of contact shall be gold, 0.000030 inch minimum thickness, electrodeposited hard gold preferred 1/.

(2) "Datum B" is the center line of contact cavities.

(3) The center line of each contact shall be located within 0.009 inch of true position with respect to "Datum B" 1/.

(4) Contact width at region of contact shall be 0.045 ± 0.002 inch 1/.

(5) Center line of shell dimension indicated shall be within 0.005 inch of "Datum B" 1/.

(6) Center line of cavity dimension indicated shall be within 0.005 inch of "Datum B" 1/.

(7) "Surface X" shall have a 4 microinch finish or better; finishing shall be done in the direction of the arrow 2/.

(8) A force of not more than 30 pounds shall be sufficient to fully insert the jack onto the sizing guage shown on Figure 68.500(f)(2). The jack is fully inserted when "Surface A" of the jack 1/ touches "Surface A" of the sizing guage.

(9) After one insertion of the jack on the sizing guage, Figure 68.500(f)(2), a force of not more than 10 pounds shall be sufficient to fully insert the jack on the continuity guage shown in Figure 68.500(f)(3). The jack is fully inserted on the continuity guage when "Surface A" of the jack 1/ touches "Surface A" of the continuity guage.

(10) When the jack is fully inserted on the continuity guage, Figure 68.500(f)(3), after having been inserted once on the sizing guage, all contacts of the jack shall electrically contact the continuity guage as determined by an electrical continuity test which applies an open circuit voltage of not more than 10 volts, and will not indicate continuity if the resistance of the circuit being checked is more than 200 ohms.

1/ Figure 68.500(f)(1).

2/ Figures 68.500(f)(2) and (f)(3).

APPENDIX A-24

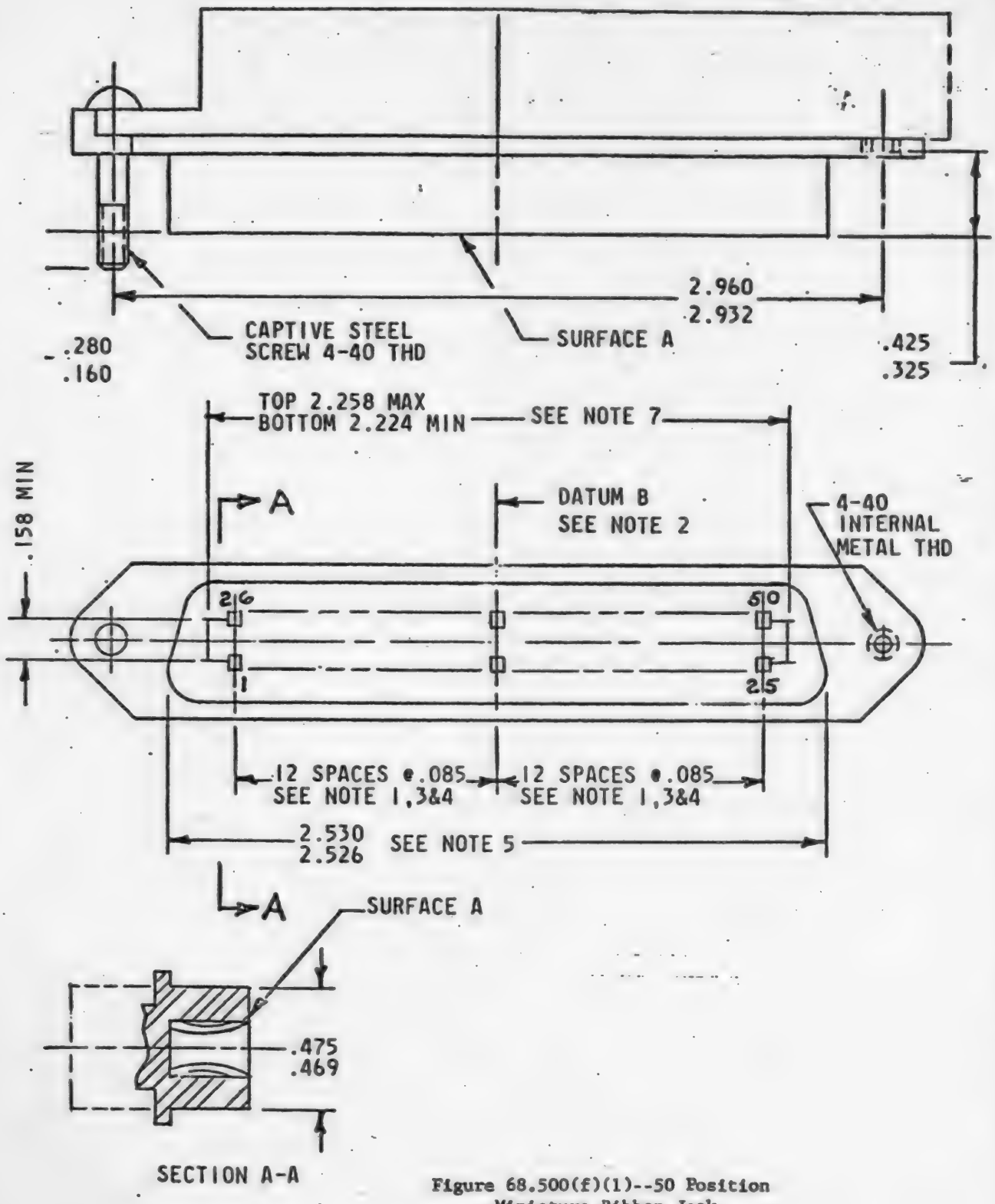
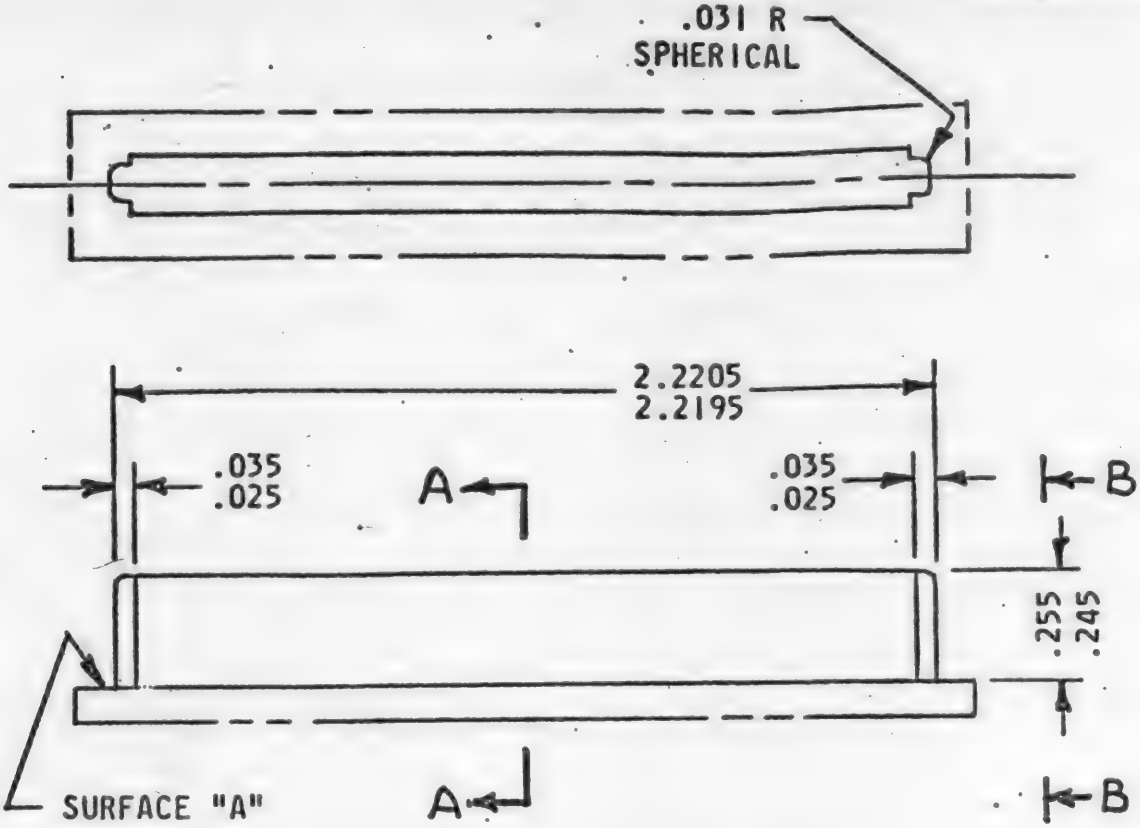


Figure 68.500(f)(1)--50 Position Miniature Ribbon Jack

APPENDIX A-25



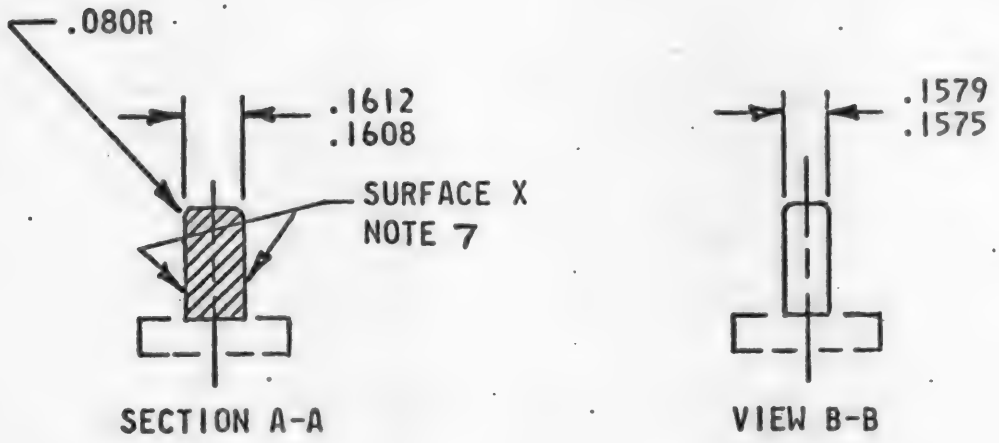
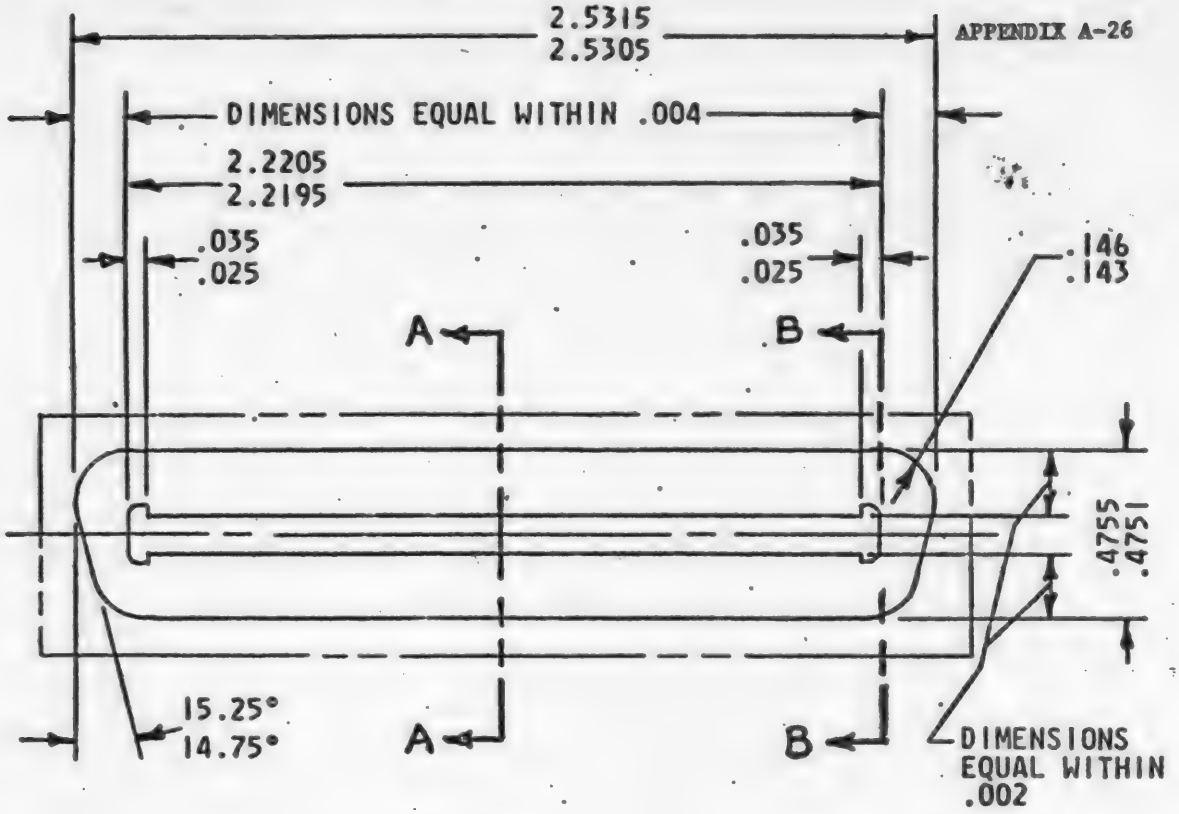
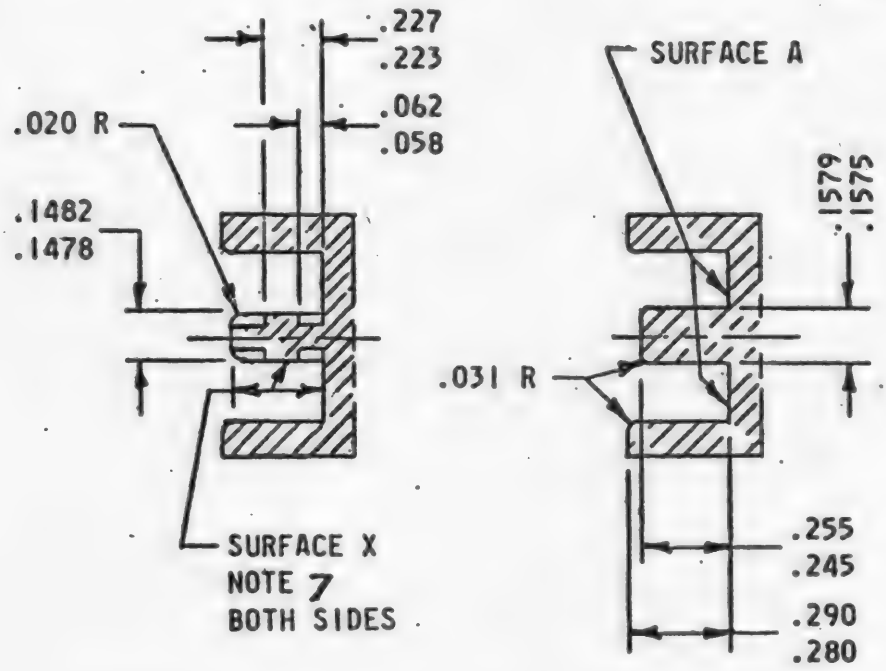


Figure 68.500(f)(2)--50 Position
Miniature Ribbon Jack
Sizing Guage

APPENDIX A-26





SECTION A-A SECTION B-B

Figure 68.500(f)(3)--50 Position
Miniature Ribbon Jack
Continuity Guage

APPENDIX A-27

(g) 3-position weatherproof plug:

Contact blade material shall be brass, with minimum 0.0003 inch thick nickel plating.
(Note: All linear dimensions are in inches.)

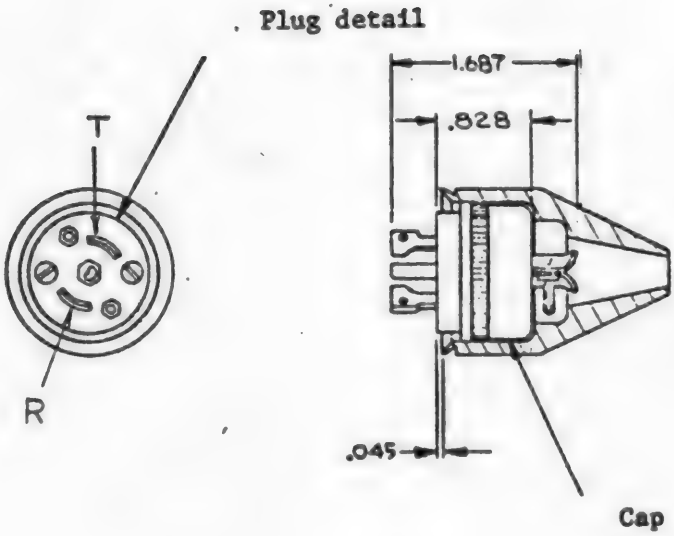
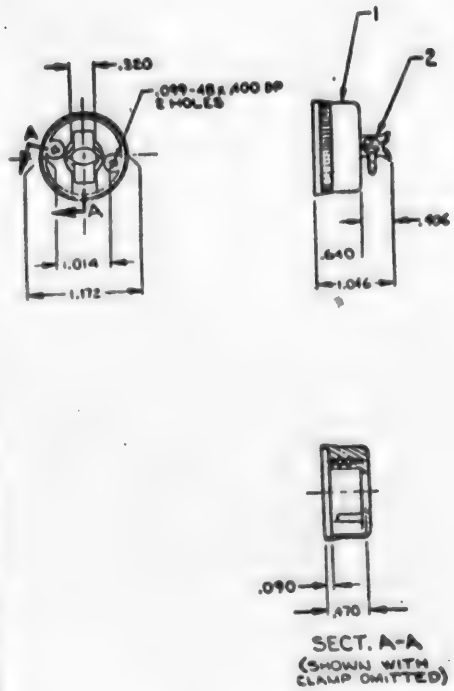
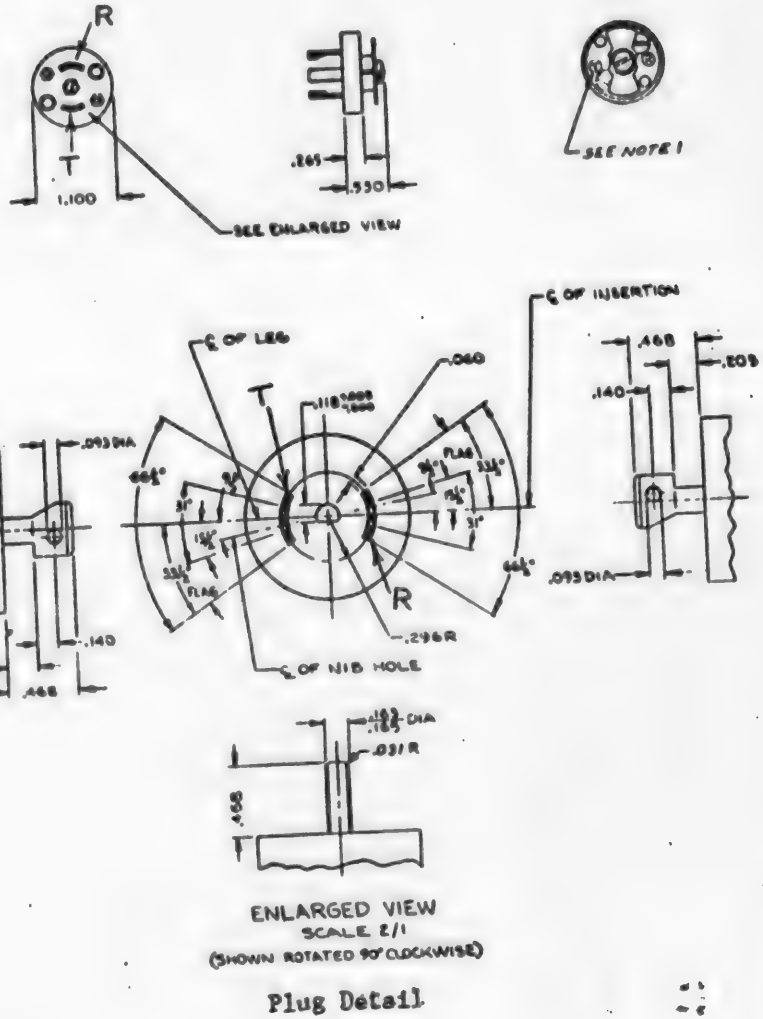


Figure 68.500(g)(1)--3 Position Plug
Plug Assembly



Cap



Plug Detail

Figure 68.500(g)(2)--3 Position
Plug Detail

APPENDIX A-29

(h) 3-position weatherproof jack:

Contact blade material shall be brass, with minimum 0.00003 inch thick nickel plating.
(Note: All linear dimensions are in inches.)

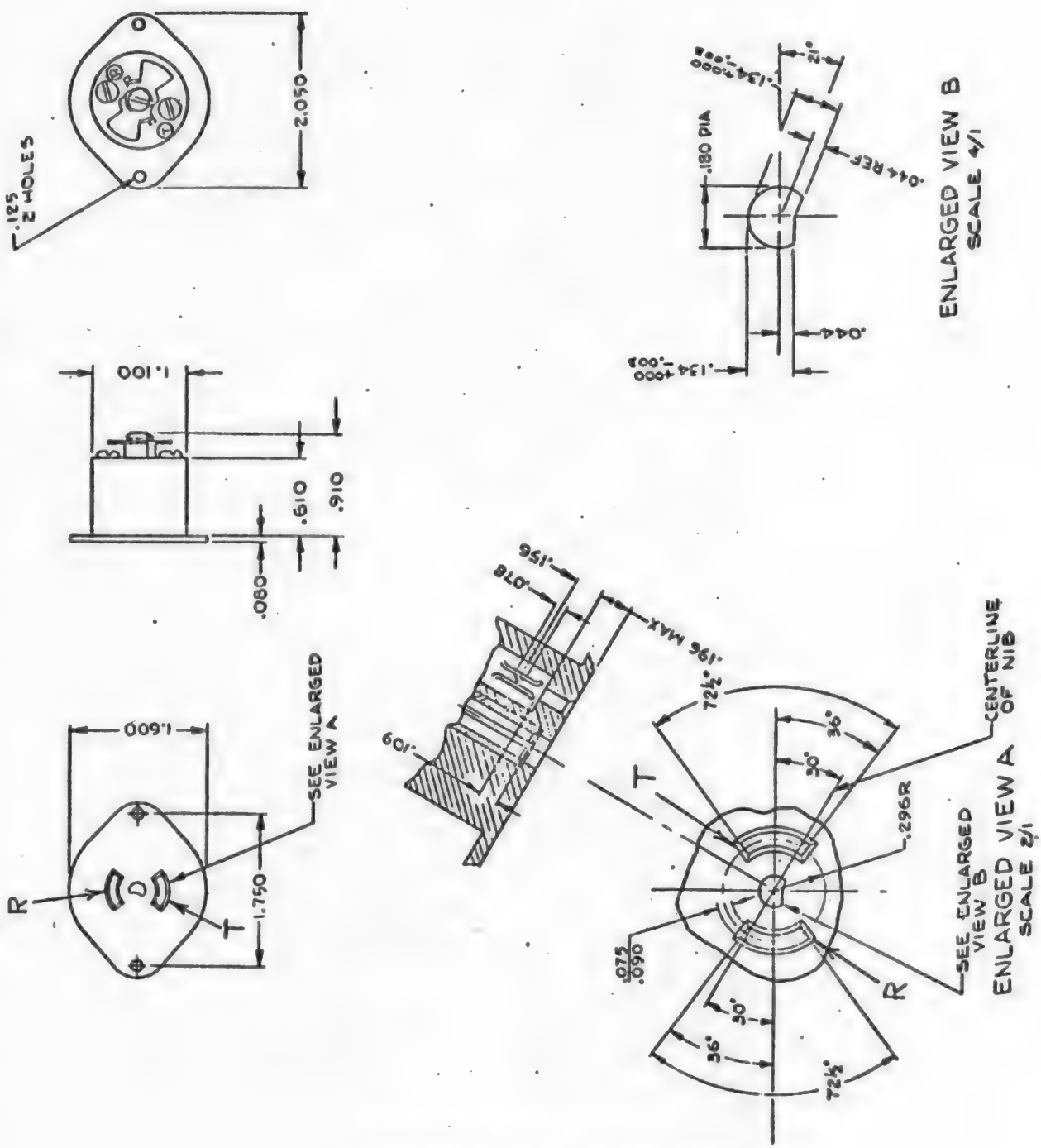
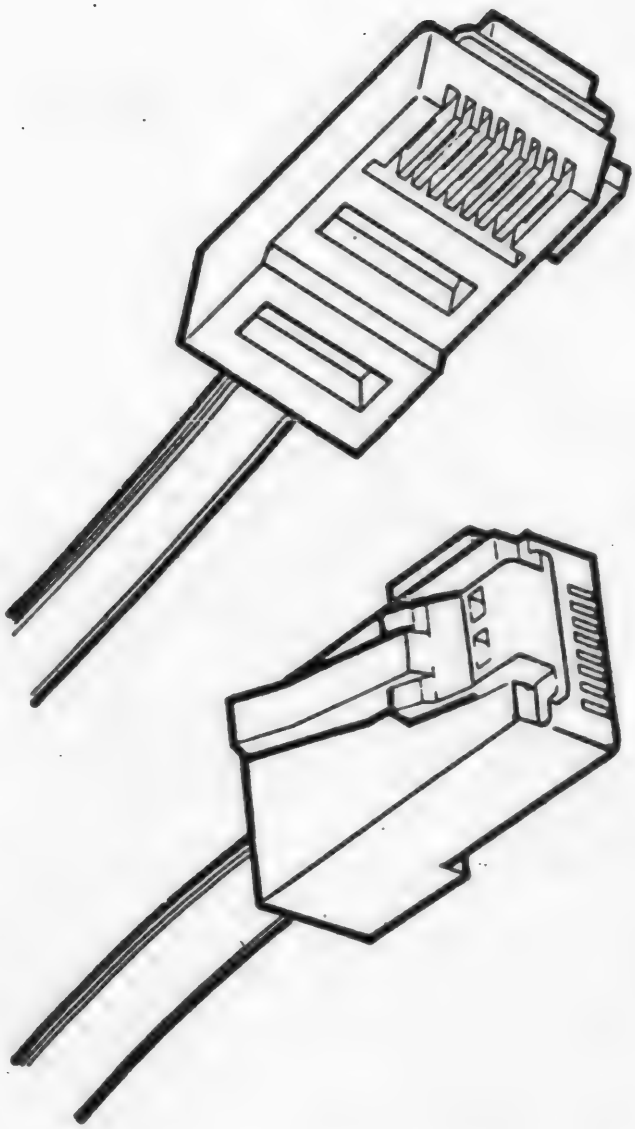


Figure 68.500(h)--3 Position Plug Detail

APPENDIX A-30

(i) Miniature 8-position keyed plug:

Figure 68.500(i)(1)--View



APPENDIX A-S1

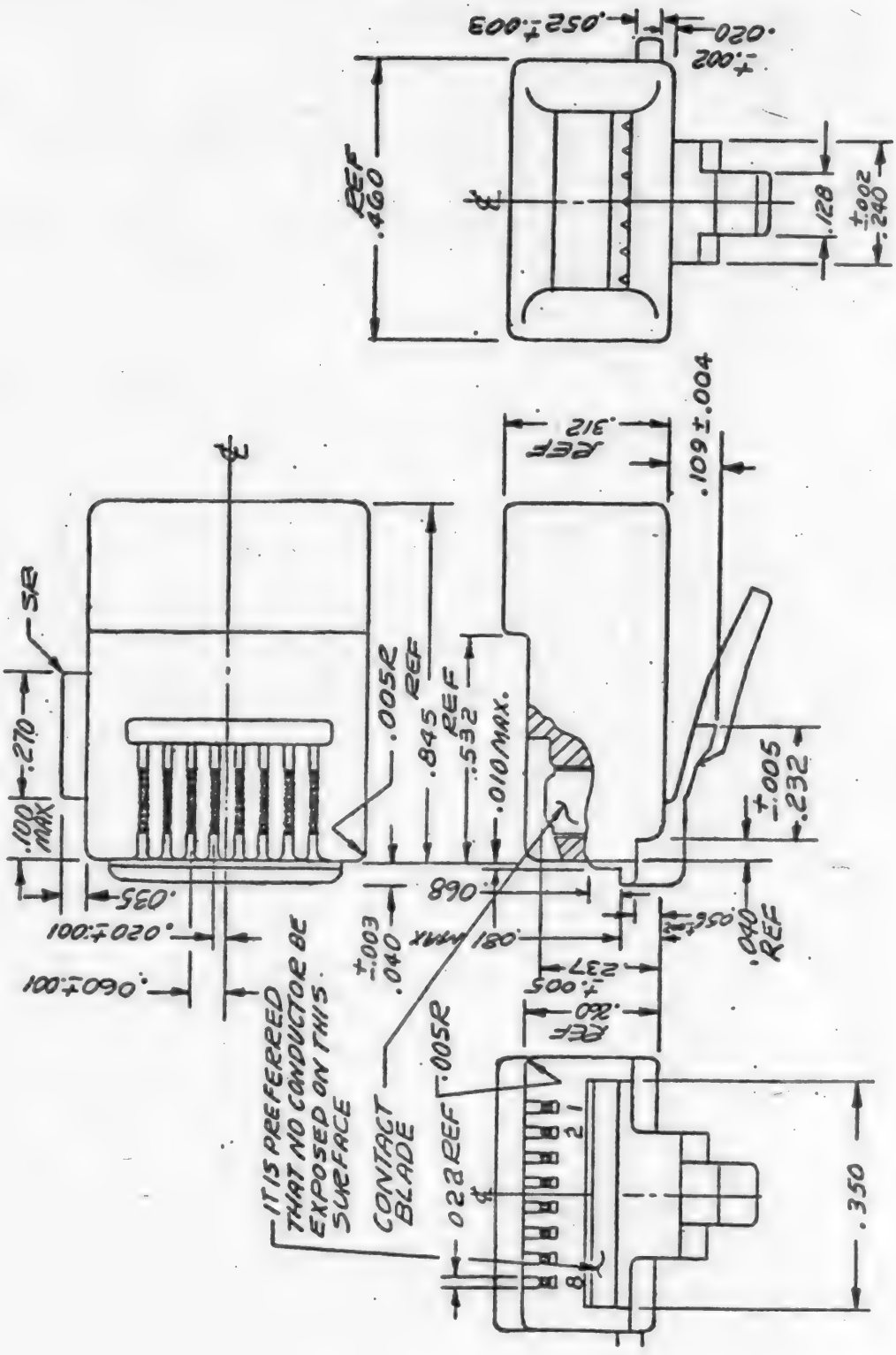


Figure 68.500(1)(2)--8 Position Keyed Plug, Mechanical Specification

APPENDIX A-32

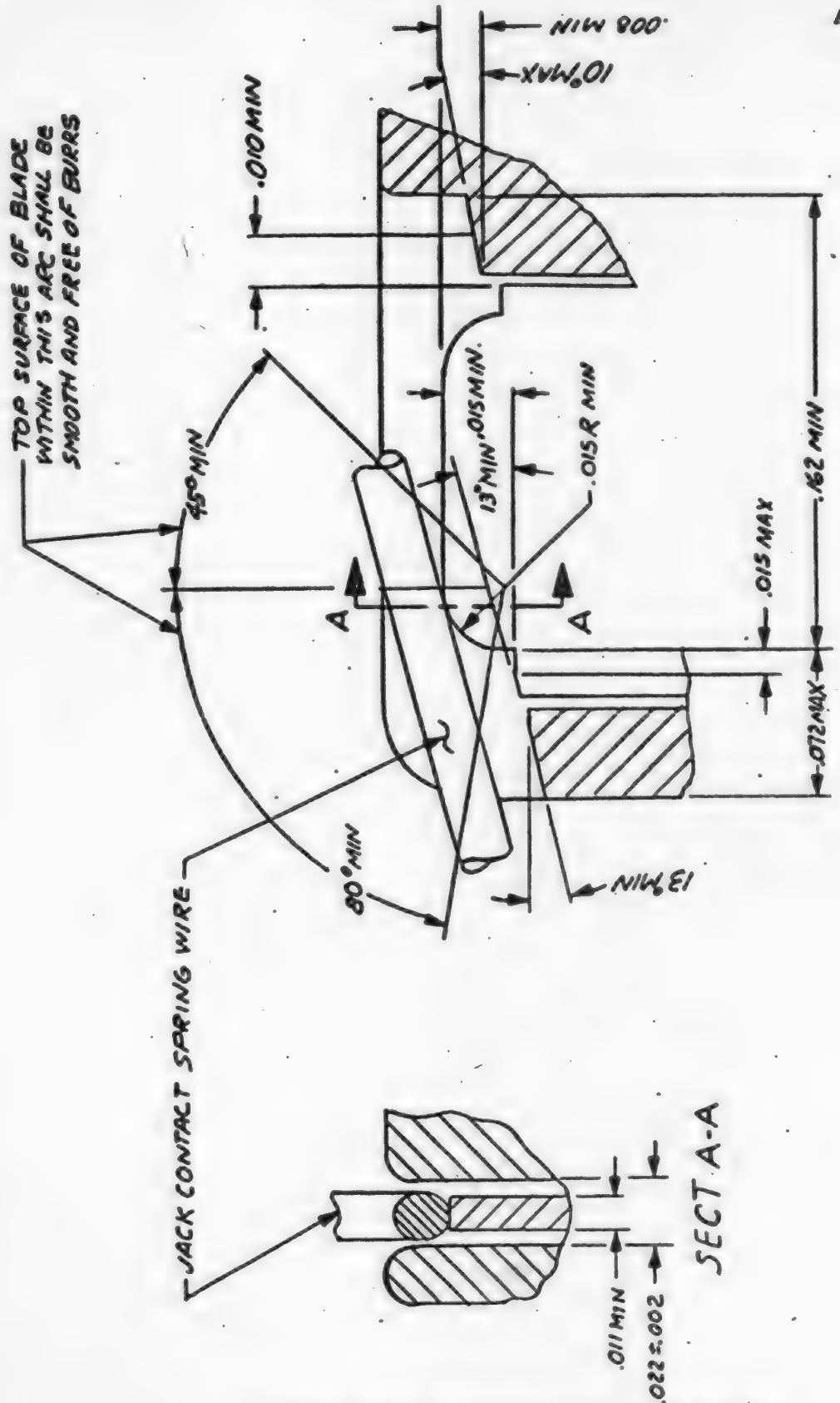
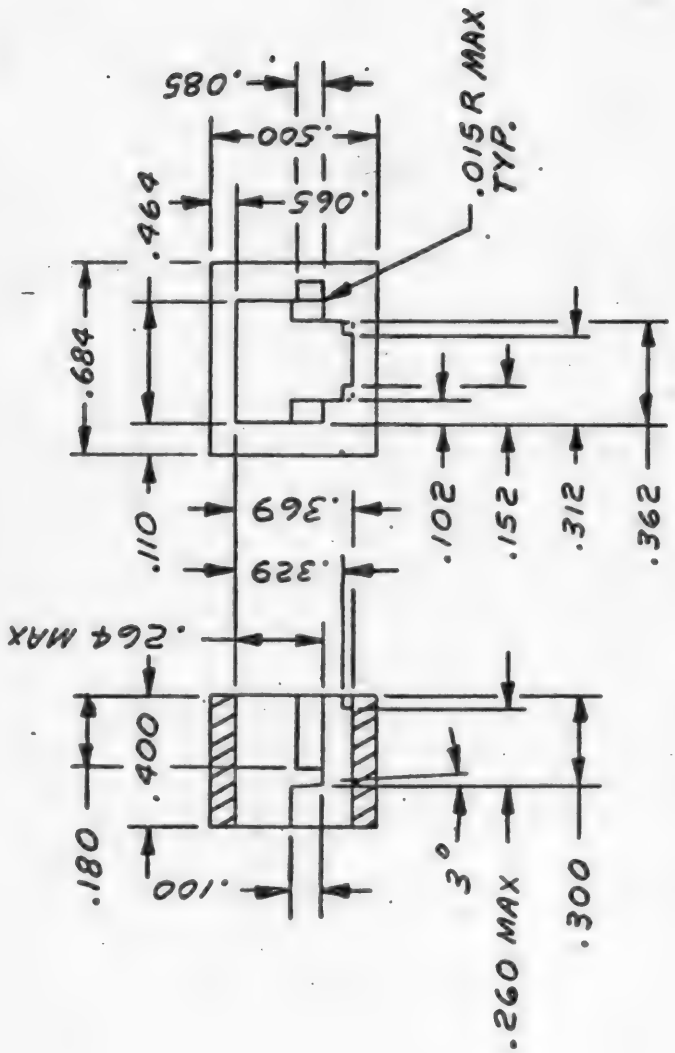


Figure 68.500(1)(3)--8 Position Keyed Plug Contact Specification

APPENDIX A-33



MAXIMUM CLEARANCE GAUGE

Figure 68.500(1)(4)--8 Position Keyed Plug Clearance Specification

APPENDIX A-34

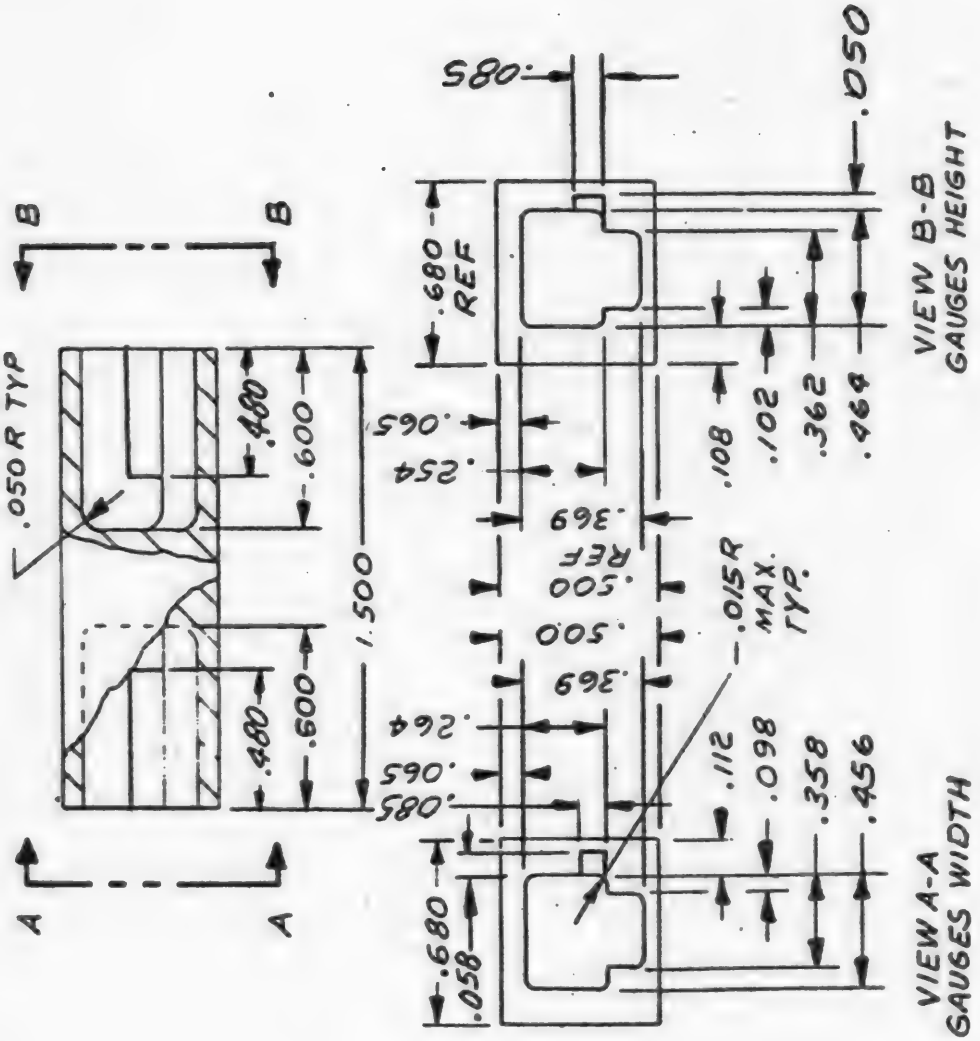
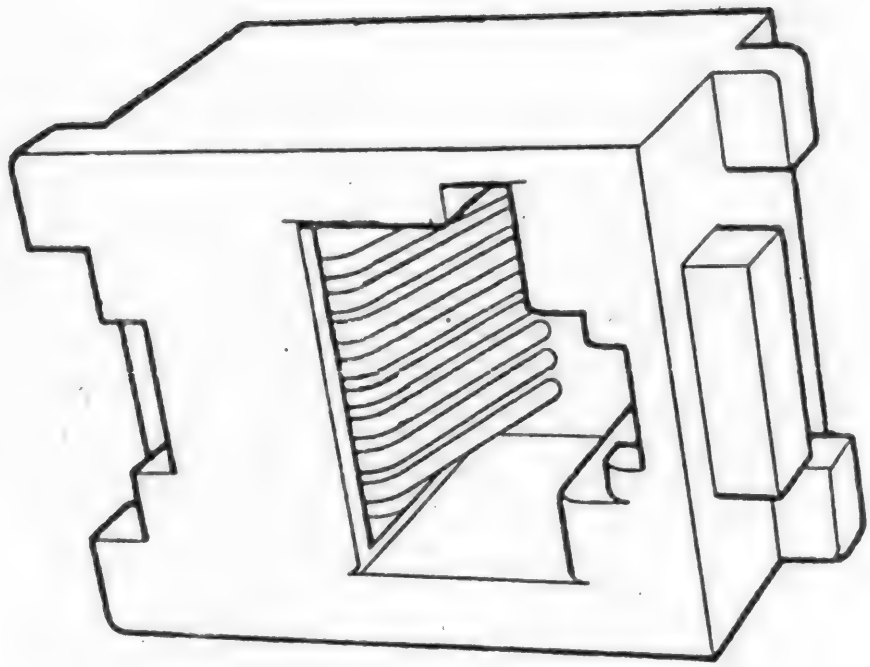


Figure 68.500(1)(5)--8 Position Keyed Plug
Clearance Specification

APPENDIX A-35

(j) Miniature 8-position keyed jack:

Figure 68.500(j)(1)--View



APPENDIX A-36

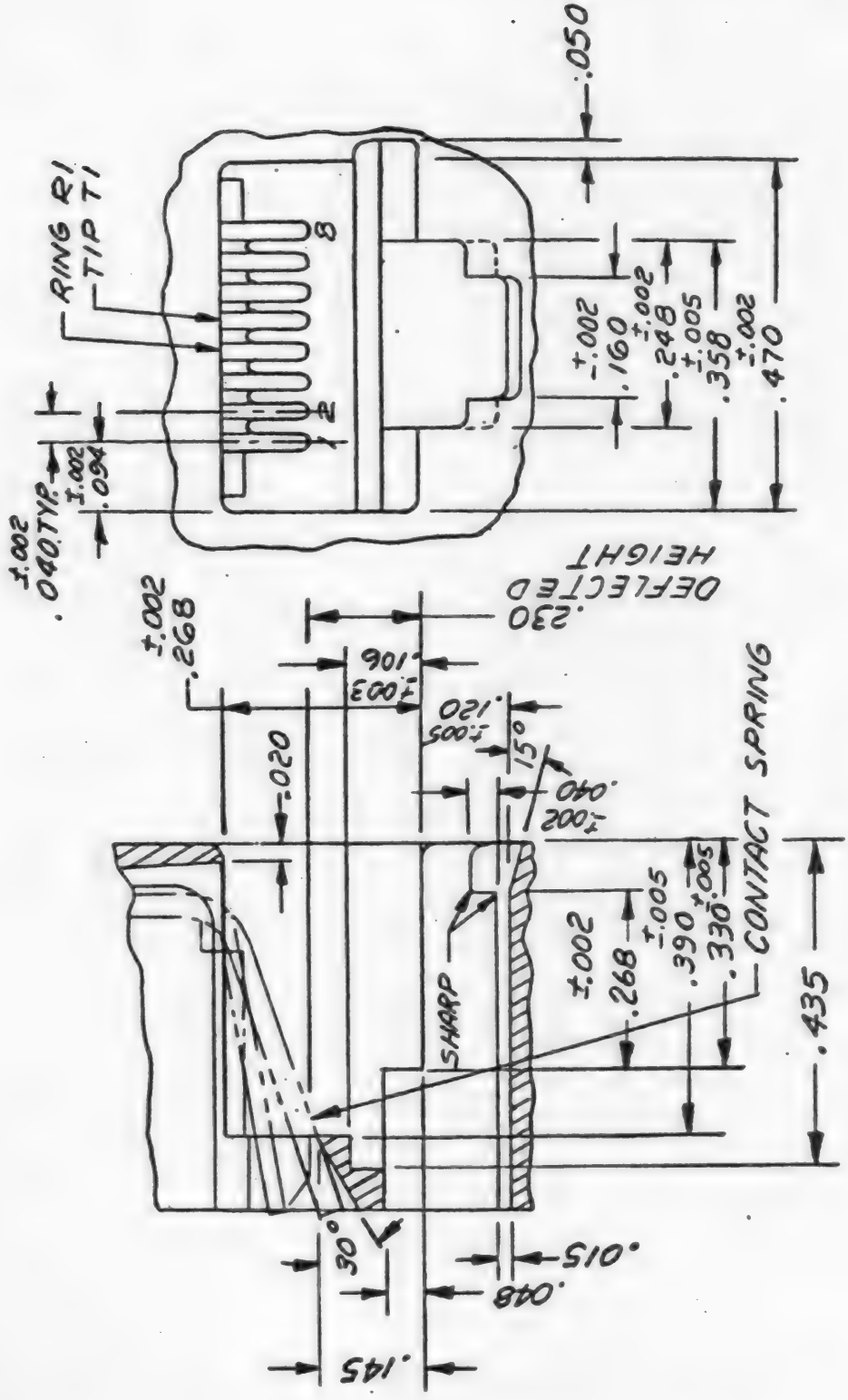


Figure 68.500(j)(2)--8 Position Keyed Jack
Mechanical Specification

APPENDIX A-37

Section 68.502 Configurations.

This Section describes connection configurations which telephone subscribers may request their local telephone company to provide, in accordance with Section 68.104 of these Rules. In the absence of a request for a specific jack configuration, the telephone company shall install the standard jack depicted in Section 68.502(a)(1). The listed configurations are for connections to be made by the telephone company to the standard jacks specified in this Subpart. Plugs on registered terminal equipment and registered protective circuitry shall be wired so as to be compatible with the jack connections specified herein. The following nomenclature is used in this Section:

T/R - Connections to the "tip" and "ring" wires of a telephone communications line, trunk, channel or facility.

A/A1 - Connections to the "hold" functions of key telephone systems which use such connections. In such systems, the "A" lead corresponding to a particular telephone line is shorted to the "A1" lead when that line is placed in the "off-hook" state to permit proper operation of the "hold" functions associated with that line.

Bridged - A bridged connection is a parallel connection.

Data - Data configurations are those which use jacks incorporating components to limit signal power levels of data equipment. Data equipment with a maximum signal power output of -9 dBm may be connected to other than data configurations. See Section 68.308 of these Rules.

A "USOC" (Universal Service Ordering Code) is specified for each configuration. These USOCs are generic telephone company service ordering codes. If a telephone subscriber wishes to have the telephone company install a standard jack other than the one depicted in Section 68.502(a)(1) below, he shall specify the appropriate USOC when requesting the installation.

APPENDIX A-38

(a) Bridged configurations other than data; single line connections.

(1) Bridged T/R; 6 position jack.

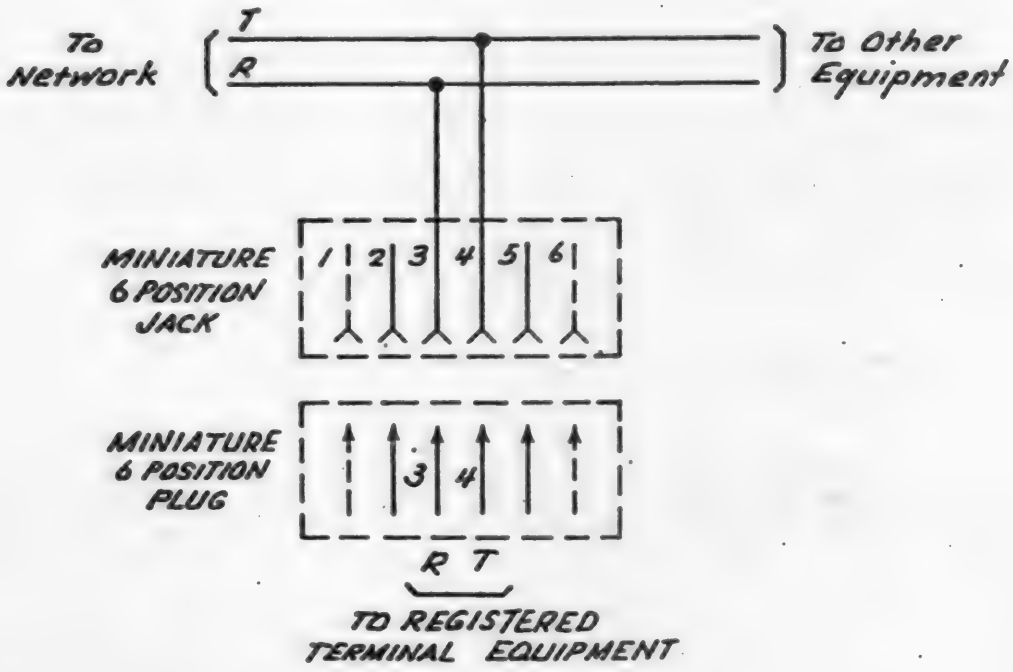
ELECTRICAL NETWORK CONNECTION: Single line bridged tip and ring only - Conductors 1, 2, 5 and 6 are reserved for telephone company use.

UNIVERSAL SERVICE ORDER CODE (USOC): RJ11W for Portable Wall-Mounted equipment - RJ11C all others.

MECHANICAL ARRANGEMENT: Miniature 6 position jack.

TYPICAL USAGE: Single line non-key telephones and ancillary devices.

WIRING DIAGRAM:



APPENDIX A-39

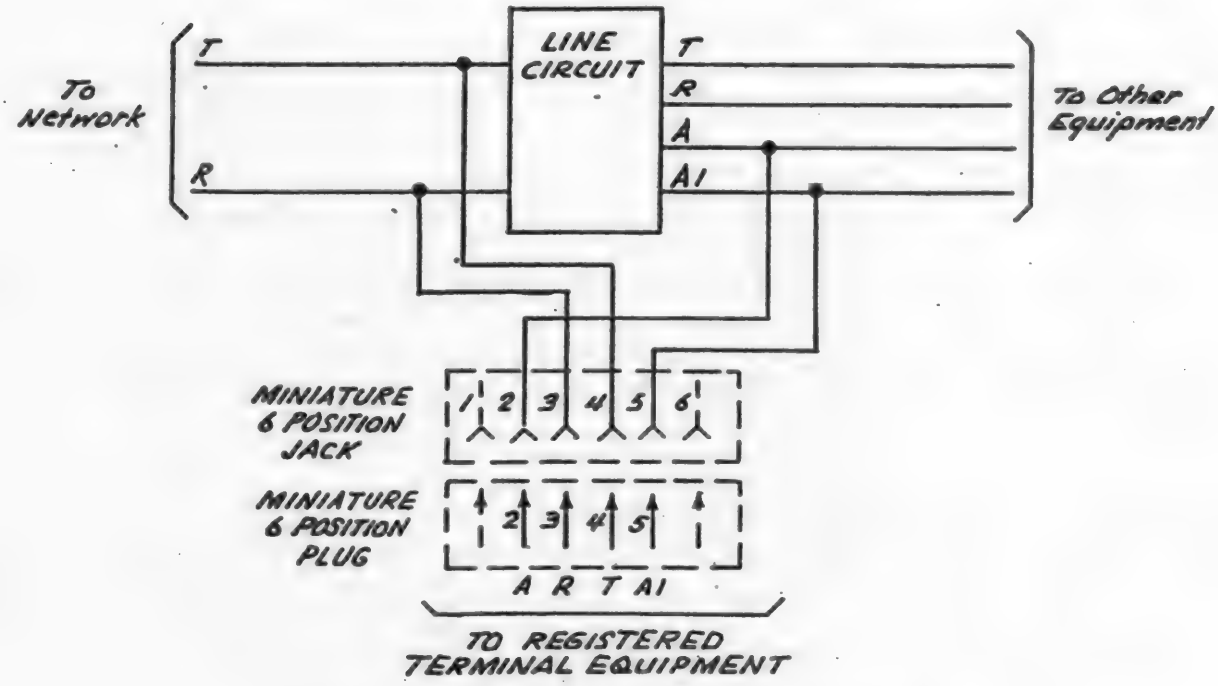
(2) Bridged T/R ahead of the line circuit of a key telephone system with A/A1; 6 position jack.

ELECTRICAL NETWORK CONNECTION: Single line bridged tip and ring ahead of the line circuit of a key system, with A and A1 leads - Conductors 1 and 6 are reserved for telephone company use.

UNIVERSAL SERVICE ORDER CODE (USOC): RJ12W for Portable Wall-Mounted equipment - RJ12C for all others.

MECHANICAL ARRANGEMENT: Miniature 6 position jack.

TYPICAL USAGE: Single line non-key telephone sets and ancillary devices connected to a key system where registered terminal equipment is not compatible with electrical characteristics of tip and ring behind line circuit.



APPENDIX A-40

(3) Bridged T/R behind the line circuit of a key telephone system with A/A1; 6 position jack.

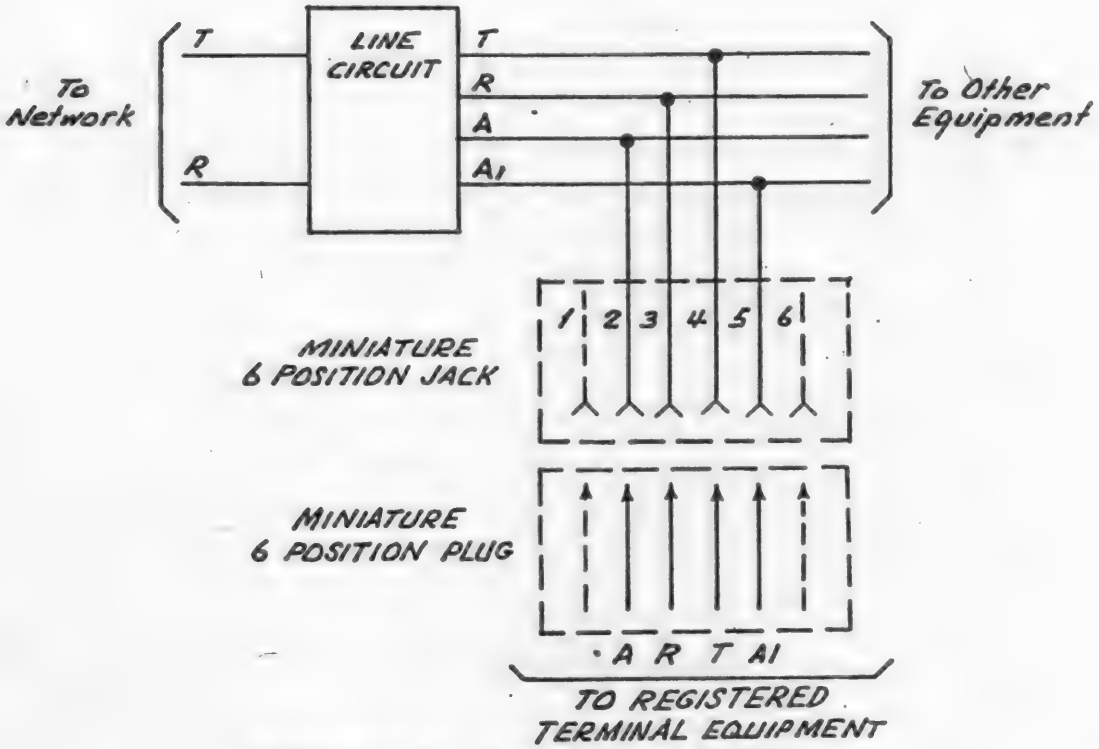
ELECTRICAL NETWORK CONNECTION: Single line bridged tip, ring, A and A1 leads behind the line circuit of a key system. Conductors 1 and 6 are reserved for telephone company use.

UNIVERSAL SERVICE ORDER CODE (USOC): RJ13W for Portable Wall-Mounted equipment - RJ13C for all others.

MECHANICAL ARRANGEMENT: Miniature 6 position jack.

TYPICAL USAGE: Single line non-key telephone sets and ancillary devices connected to a key system. This arrangement is preferred to arrangement shown in Subsection (a)(2).

WIRING DIAGRAM:



APPENDIX A-41

(4) Bridged T/R; 3 position weatherproof jack.

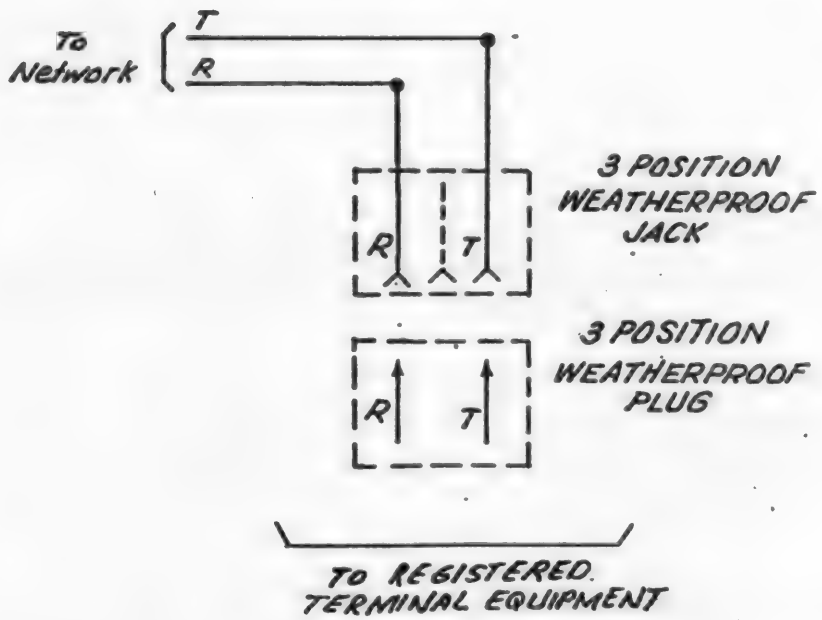
ELECTRICAL NETWORK CONNECTION: Single line bridged tip and ring.

UNIVERSAL SERVICE ORDER CODE: RJ15C

MECHANICAL ARRANGEMENT: 3 position weatherproof jack

TYPICAL USAGE: Providing telephone service to boats in marinas.

WIRING DIAGRAM:



APPENDIX A-42

(b) Series configurations.

(1) Series T/R ahead of all station equipment; 8 position series jack.

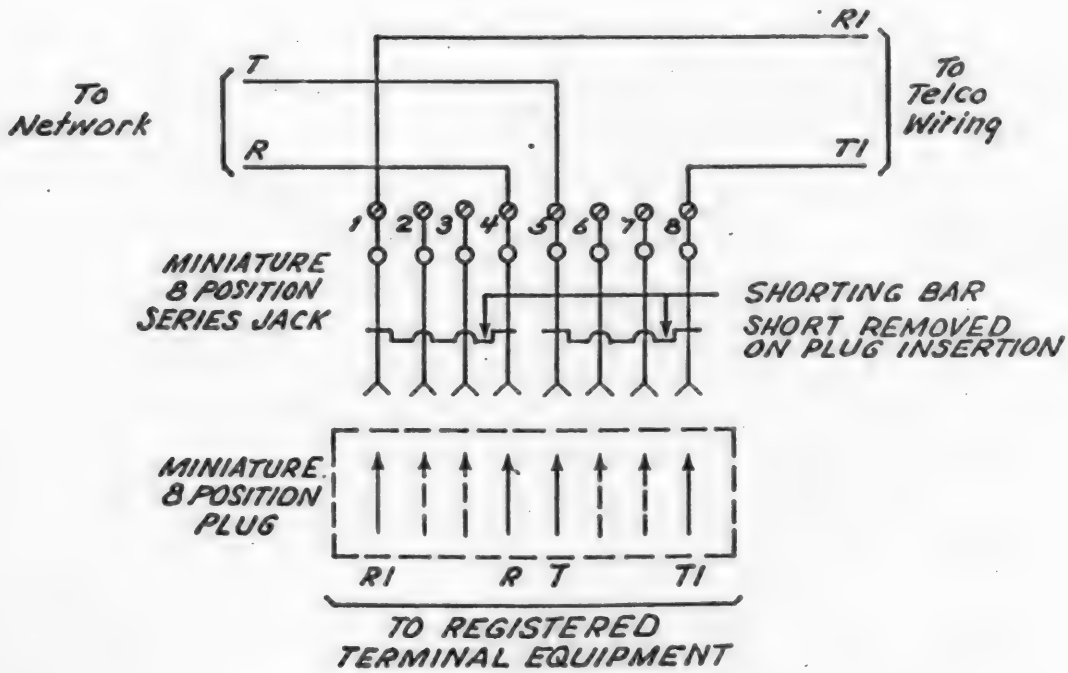
ELECTRICAL NETWORK CONNECTION: Series tip and ring ahead of all station equipment. Conductors 2, 3, 6 and 7 are reserved for telephone company use.

UNIVERSAL SERVICE ORDER CODE (USOC): RJ31X

MECHANICAL ARRANGEMENT: Miniature 8 position series jack

TYPICAL USAGE: Alarm reporting devices.

WIRING DIAGRAM:



APPENDIX A-43

(2) Series T/R at station; 8 position series jack.

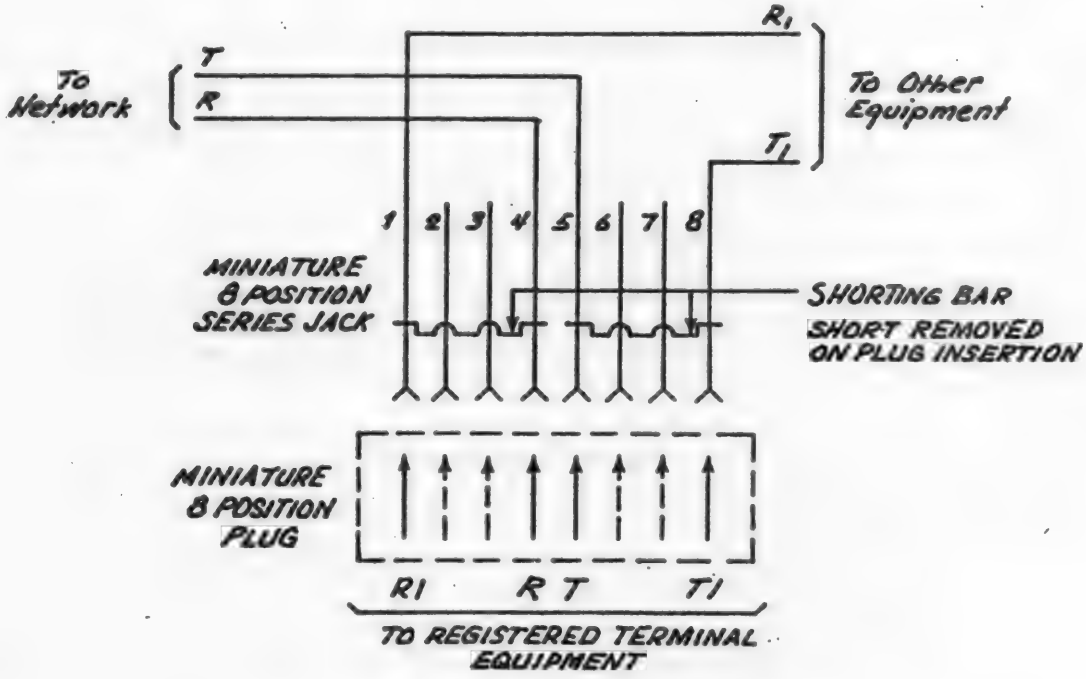
ELECTRICAL NETWORK CONNECTION: Series tip and ring. Conductors 2, 3, 6 and 7 are reserved for telephone company use.

UNIVERSAL SERVICE ORDER CODE (USOC): RJ32X

MECHANICAL ARRANGEMENT: Miniature 8 position series jack.

TYPICAL USAGE: Series ancillary devices such as automatic dialers. Single line sets with exclusion.

WIRING DIAGRAM:



APPENDIX A-44

(3) Series T/R ahead of the line circuit of a key telephone system with A/A1; 8 position series jack.

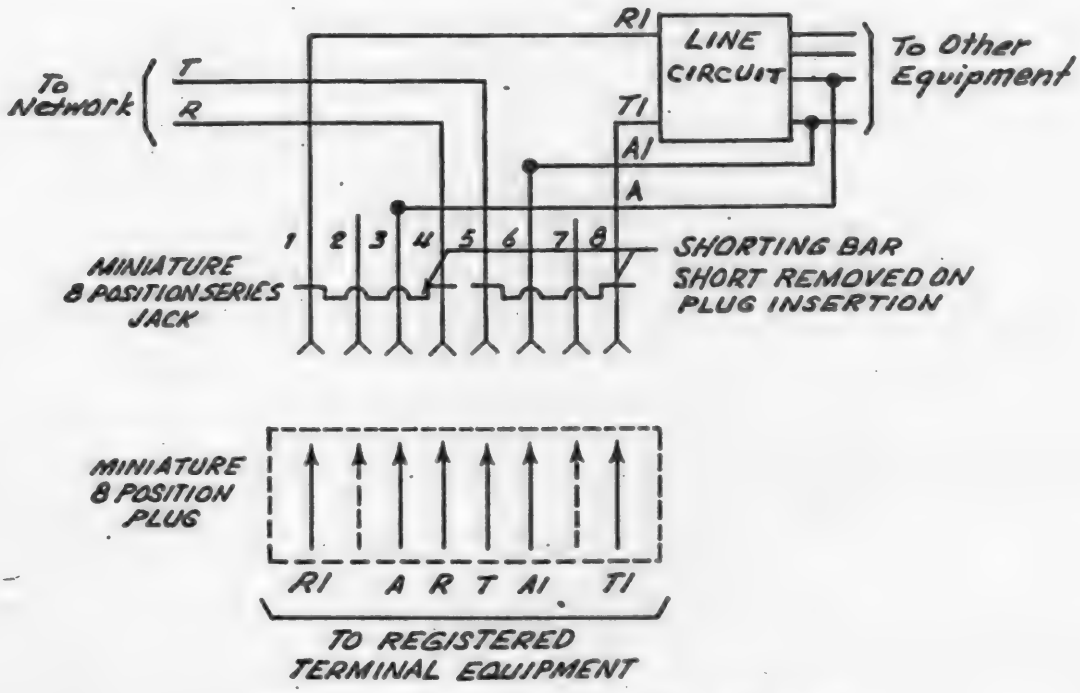
ELECTRICAL NETWORK CONNECTION: Series tip and ring ahead of the line circuit of a key system with A and A1 leads. Conductors 2 and 7 are reserved for telephone company use.

UNIVERSAL SERVICE ORDER CODE (USOC): RJ33X

MECHANICAL ARRANGEMENT: Miniature 8 position series jack

TYPICAL USAGE: Series ancillary devices connected to a key system where registered terminal equipment is not compatible with electrical characteristics of tip and ring behind line circuit.

WIRING DIAGRAM:



APPENDIX A-45

(4) Series T/R behind the line circuit of a key telephone system with A/Al; 8 position series jack.

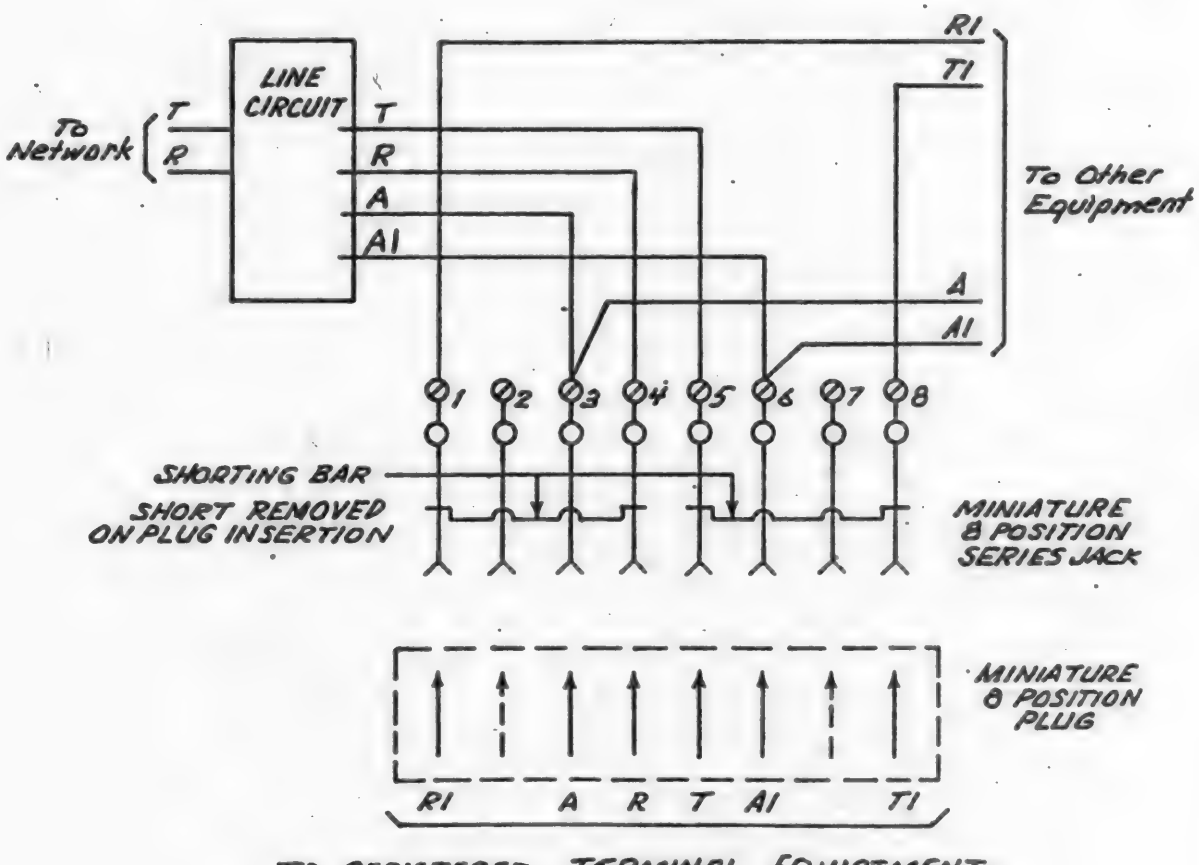
ELECTRICAL NETWORK CONNECTION: Series tip, ring, A and Al leads behind the line circuit of a key system. Conductors 2 and 7 are reserved for telephone company use.

UNIVERSAL SERVICE ORDER CODE (USOC): RJ34X

MECHANICAL ARRANGEMENT: Miniature 8 position series jack

TYPICAL USAGE: A single line set with exclusion or series ancillary device connected to a key system. This arrangement is preferred to arrangement shown in Subsection (b)(3).

WIRING DIAGRAM:



APPENDIX A-46

(5) Series T/R at key telephone station, behind station pickup key with A/A1; 8 position series jack.

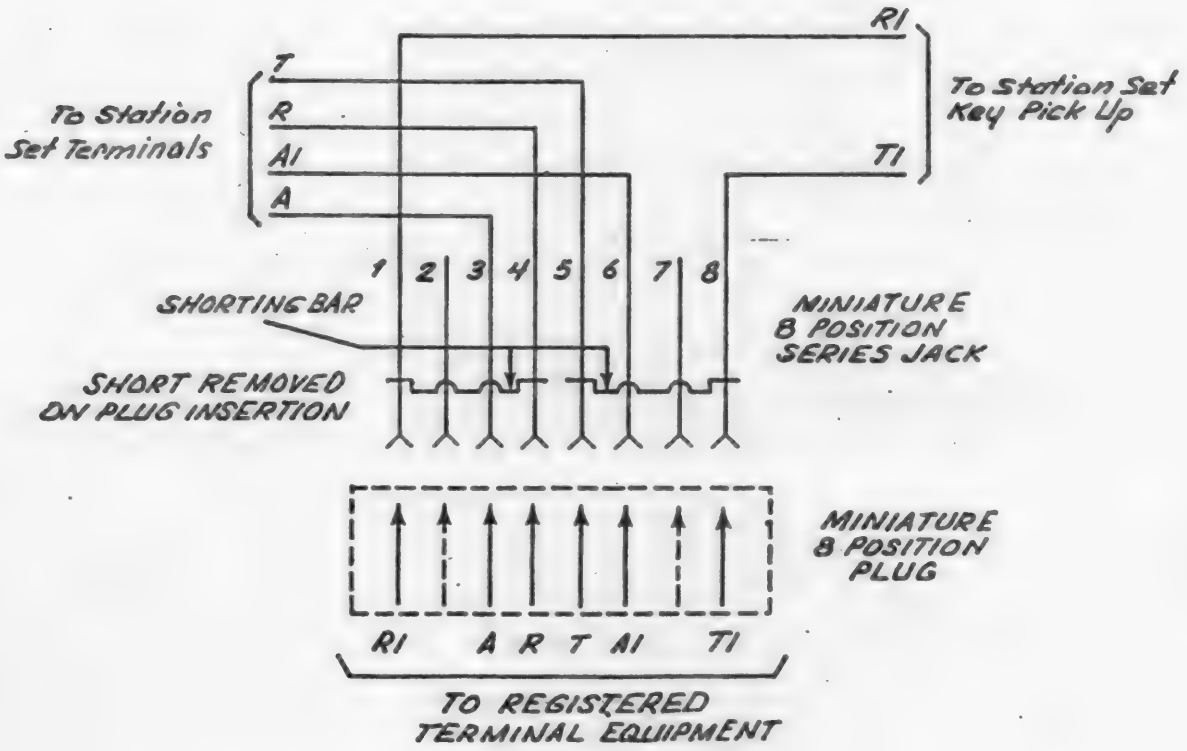
ELECTRICAL NETWORK CONNECTION: Series connection to the multipled tip, ring, A and A1 leads behind the pick-up keys of a key telephone.

UNIVERSAL SERVICE ORDER CORD (USOC): RJ35X

MECHANICAL ARRANGEMENT: Miniature 8 position series jack.

TYPICAL USAGE: Series ancillary devices connected to key telephone set.

WIRING DIAGRAM:



APPENDIX A-47

(6) Series T/R with mode indication signal; 8 position series jack.

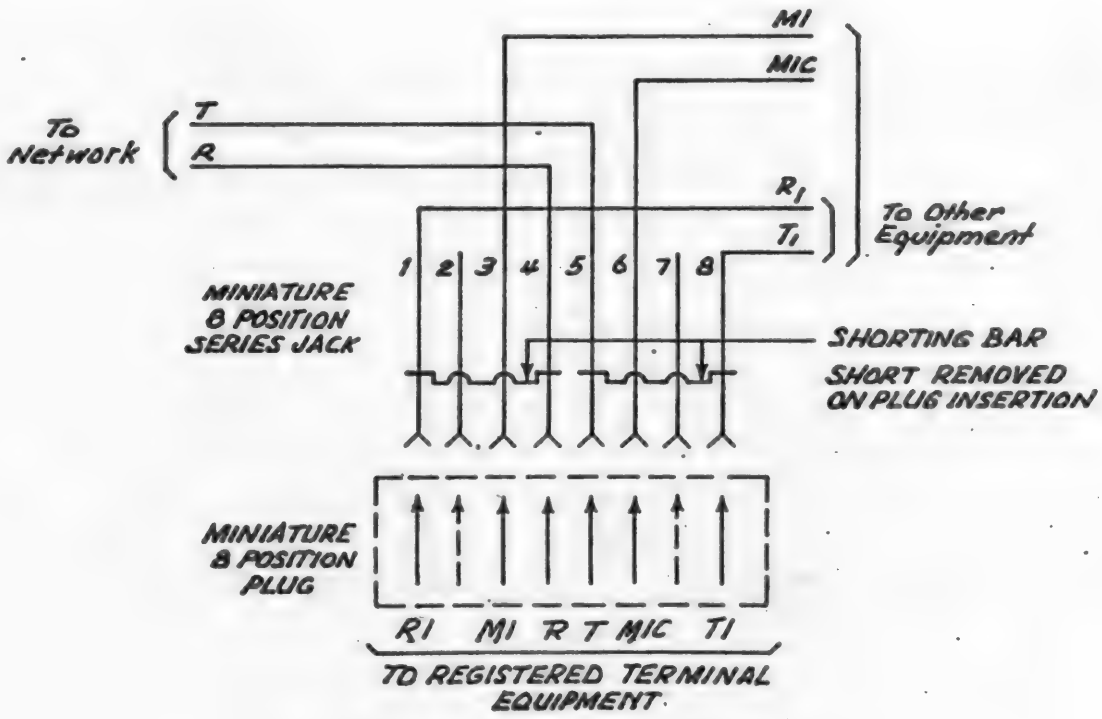
ELECTRICAL NETWORK CONNECTION: Series tip and ring with mode indication to station behind series connection. Conductors 2 and 7 are reserved for telephone company use.

UNIVERSAL SERVICE ORDER CODE (USOC): RJ36X

MECHANICAL ARRANGEMENT: Miniature 8 position series jack

TYPICAL USAGE: Mode indication (exclusion key) telephone set in series with data jack. Customer shall specify whether a closure or open shall indicate "exclusion" mode.

WIRING DIAGRAM:



APPENDIX A-48

(c) Two-line configurations.

(1) Bridged T/R; 6 position jack.

ELECTRICAL NETWORK CONNECTION: Two line bridged tip and ring.

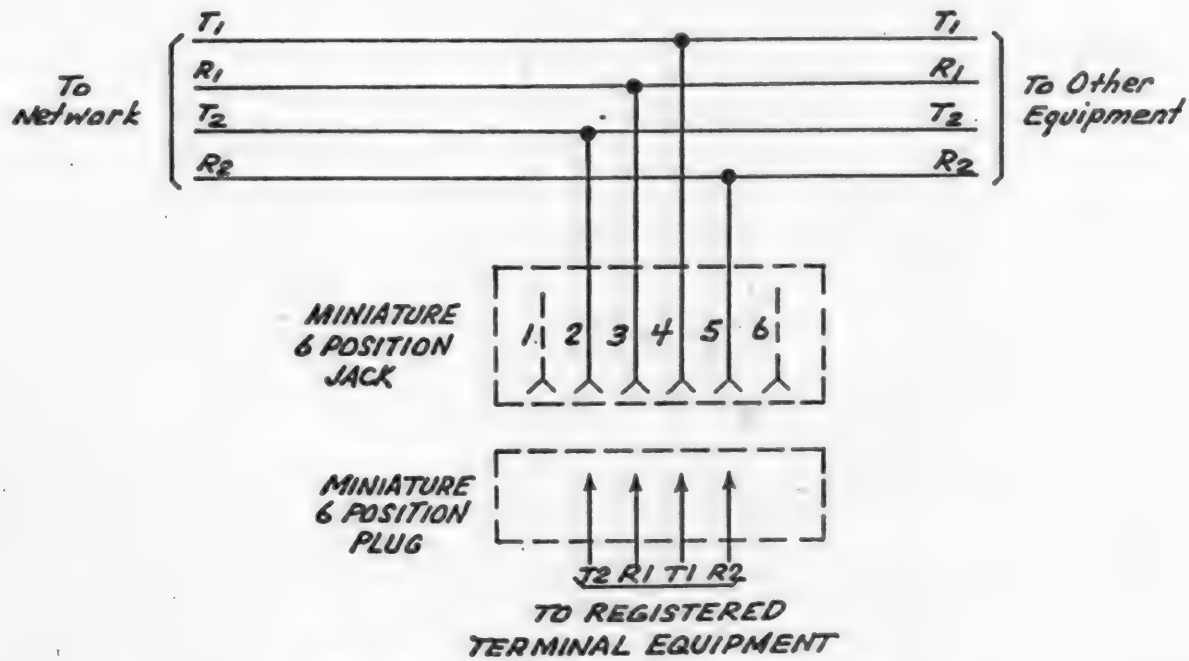
UNIVERSAL SERVICE ORDER CODE (USOC): RJ14W for Portable Wall-Mounted equipment - RJ14C for all others.

MECHANICAL ARRANGEMENT: Miniature 6 position jack.

TYPICAL USAGE: Two line non-key telephone sets and ancillary devices.

WIRING DIAGRAM:

Note: The telephone company will wire the lines to the jack in the sequence designated by the customer.



APPENDIX A-49

(2) Series T/R on first line and bridged T/R on second line; 8 position series jack.

ELECTRICAL NETWORK CONNECTION: Two line bridged tip and ring with exclusion on Line 1. Conductors 2 and 7 reserved for telephone company use.

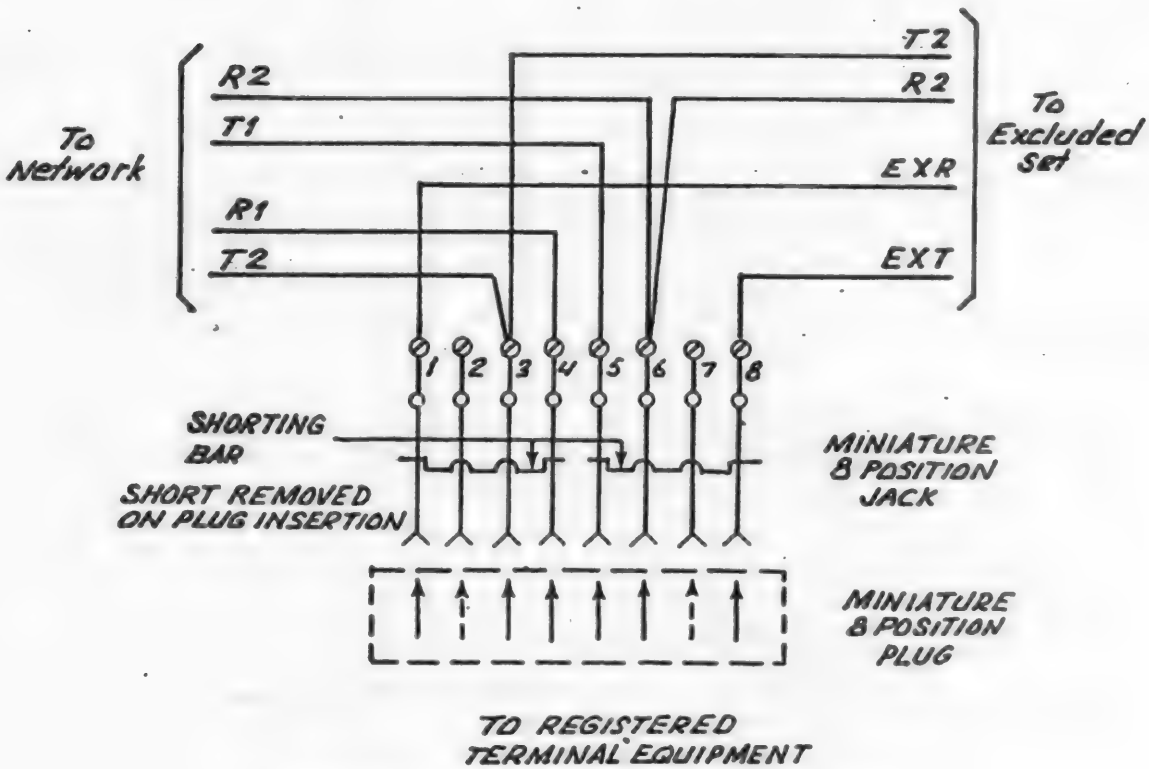
UNIVERSAL SERVICE ORDER CODE (USOC): RJ37X

MECHANICAL ARRANGEMENT: Miniature 8 position series jack

TYPICAL USAGE: Two line telephones with exclusion on one line.

WIRING DIAGRAM:

Note: The telephone company will wire the lines to the jack in the sequence designated by the customer.



APPENDIX A-50

(d) Multiple-line bridged configurations.

(1) Up to 25 bridged T/R; 50 position jack.

ELECTRICAL NETWORK CONNECTION: Multiple line bridged tip and ring.

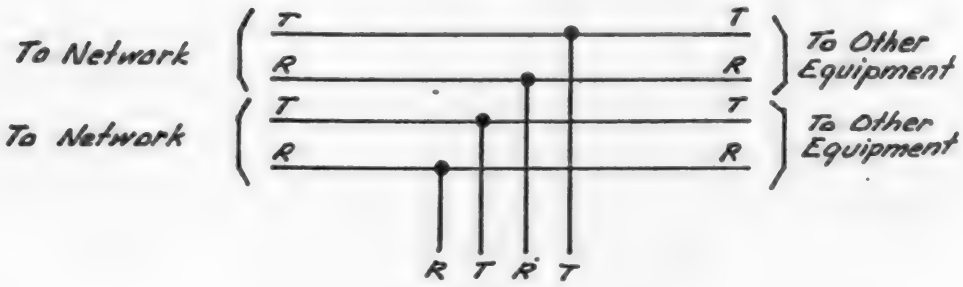
UNIVERSAL SERVICE ORDER CODE (USOC): RJ21X

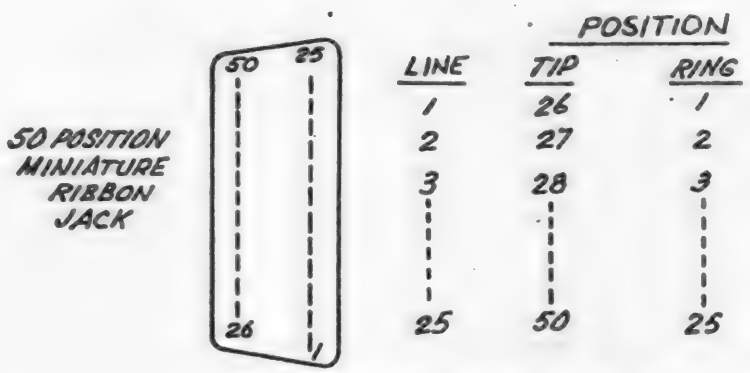
MECHANICAL ARRANGEMENT: 50 position miniature ribbon jack.

TYPICAL USAGE: Traffic data recording equipment.

WIRING DIAGRAM:

Note: At the time the jack is ordered the customer must specify the sequence in which the central office lines are to be connected to the jack. The telephone company will consecutively wire these lines to the jack as shown below without skipping any positions.





APPENDIX A-51

(2) Up to 12 bridged T/R ahead of the line circuit of a key telephone system with A/A1 connections; 50 position jack.

ELECTRICAL NETWORK CONNECTION: Multiple line bridged tip and ring ahead of the line circuit of a key system with A and A1 leads.

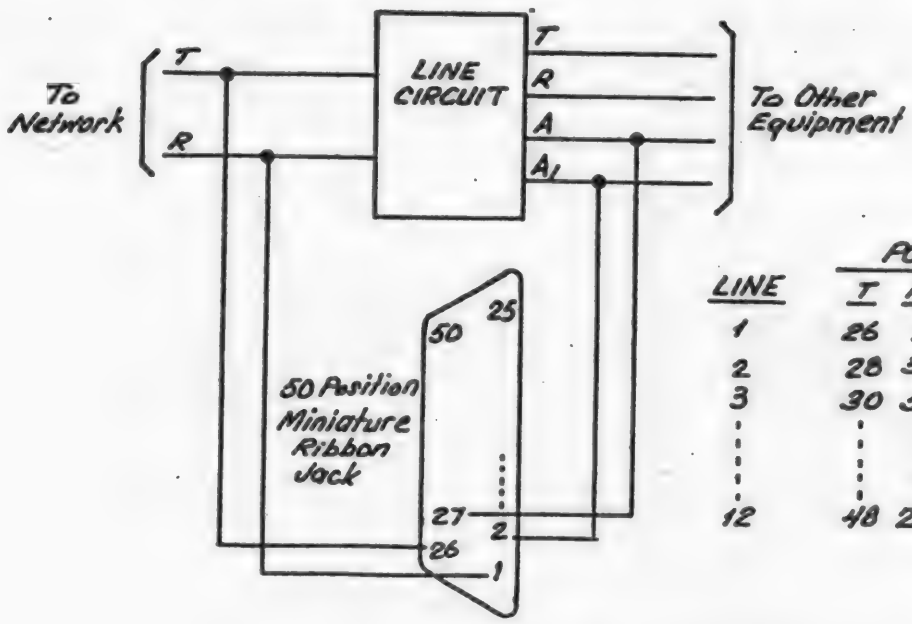
UNIVERSAL SERVICE ORDER CODE (USOC): RJ22X

MECHANICAL ARRANGEMENT: 50 position miniature ribbon jack.

TYPICAL USAGE: 2 to 12 ancillary devices connected to a key system at one location where registered terminal equipment is not compatible with electrical characteristics of tip and ring behind line circuit.

WIRING DIAGRAM:

Note: At the time the jack is ordered the customer must specify the sequence in which the central office lines are to be connected to the jack. The telephone company will consecutively wire these lines to the jack as shown below without skipping any positions.



LINE	POSITION			
	T	R	A	A1
1	26	1	27	2
2	28	3	29	4
3	30	5	31	6
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
12	48	23	49	24

APPENDIX A-52

(3) Up to 12 bridged T/R behind the line circuit of a key telephone system with A/Al connections; 50 position jack.

ELECTRICAL NETWORK CONNECTION: Multiple line bridged tip, ring, A and Al leads behind the line circuit of a key system.

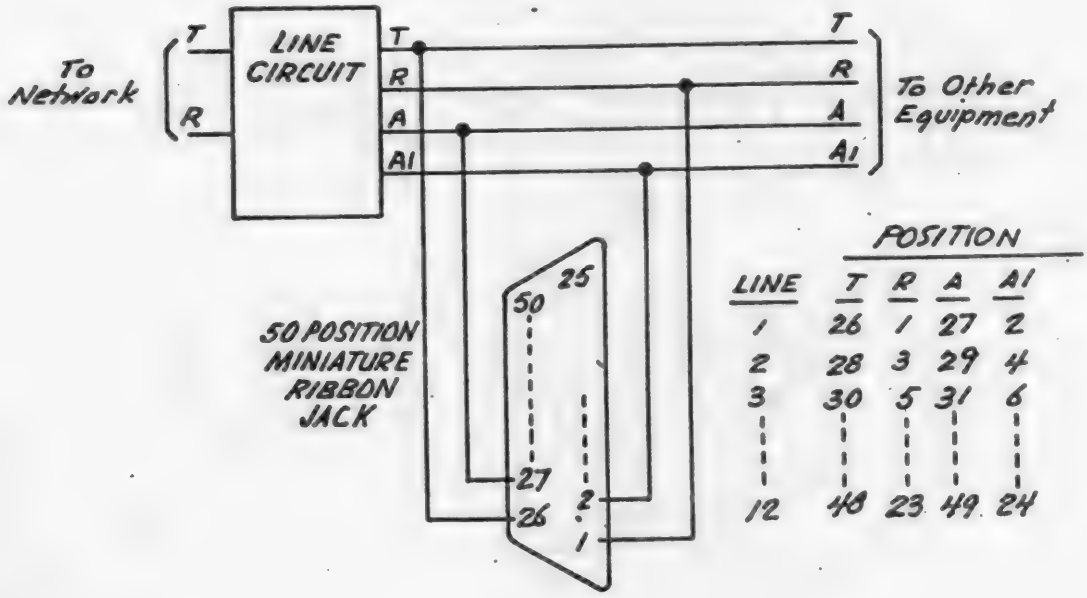
UNIVERSAL SERVICE ORDER CODE (USOC): RJ23X

MECHANICAL ARRANGEMENT: 50 position miniature ribbon jack.

TYPICAL USAGE: 2 to 12 ancillary devices connected to a key system at one location. This arrangement is preferred to the one shown in Figure 14.

WIRING DIAGRAM:

Note: At the time the jack is ordered the customer must specify the sequence in which the central office lines are to be connected to the jack. The telephone company will consecutively wire these lines to the jack as shown below without skipping any positions.



APPENDIX A-53

(4) Up to 5 bridged T/R behind the line circuit of a key telephone system with A/A1 connections; 50 position jack.

ELECTRICAL NETWORK CONNECTION: Multiple line bridged tip, ring, A and A1 leads behind the line circuit of a key system. This arrangement has the same wiring arrangement as a standard 5 line key telephone set.

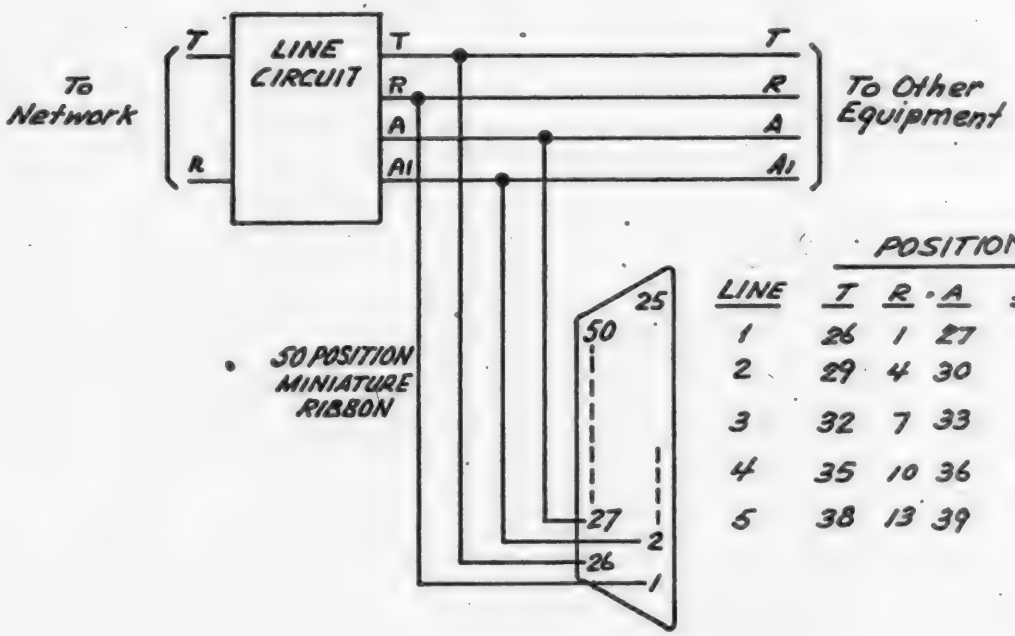
UNIVERSAL SERVICE ORDER CODE (USOC): RJ24X

MECHANICAL ARRANGEMENT: 50 position miniature ribbon jack.

TYPICAL USAGE: Ancillary devices connected to a key system such as 5 line conferencing device.

WIRING DIAGRAM:

Note: At the time the jack is ordered the customer must specify the sequence in which the central office lines are to be connected to the jack. The telephone company will consecutively wire these lines to the jack as shown below without skipping any positions.



LINE	POSITION T	R	A	A1
1	26	1	27	2
2	29	4	30	2
3	32	7	33	2
4	35	10	36	2
5	38	13	39	2

APPENDIX A-54

(e) Data Configurations. There are two categories of data configurations, which may be implemented either on an 8 position keyed data jack, or on a 50 position unkeyed ribbon jack. These are: a "universal" configuration, which incorporates both a programming resistor (for programmed data signal power limiting) and an attenuator (for "fixed-loss loop" data signal power limiting), and a "programmed" configuration, which incorporates a programming resistor, but not an attenuator. The programming resistor is selected as follows:

The proper programming resistor (Rp) shall be selected by the telephone company at the time of installation based upon the loop loss of the telephone line to arrive at the optimum signal power level of -12 dBm at the central office. The table shown below gives the required signal power output for the programmed data equipment for each value of the programming resistor.

Programming Resistor (Rp)*	Programmed Data Equipment Signal Power Output**
short	0 dbm
150 ohms	-1 dbm
336 ohms	-2 dbm
569 ohms	-3 dbm
866 ohms	-4 dbm
1,240 ohms	-5 dbm
1,780 ohms	-6 dbm
2,520 ohms	-7 dbm
3,610 ohms	-8 dbm
5,490 ohms	-9 dbm
9,200 ohms	-10 dbm
19,800 ohms	-11 dbm
open	-12 dbm

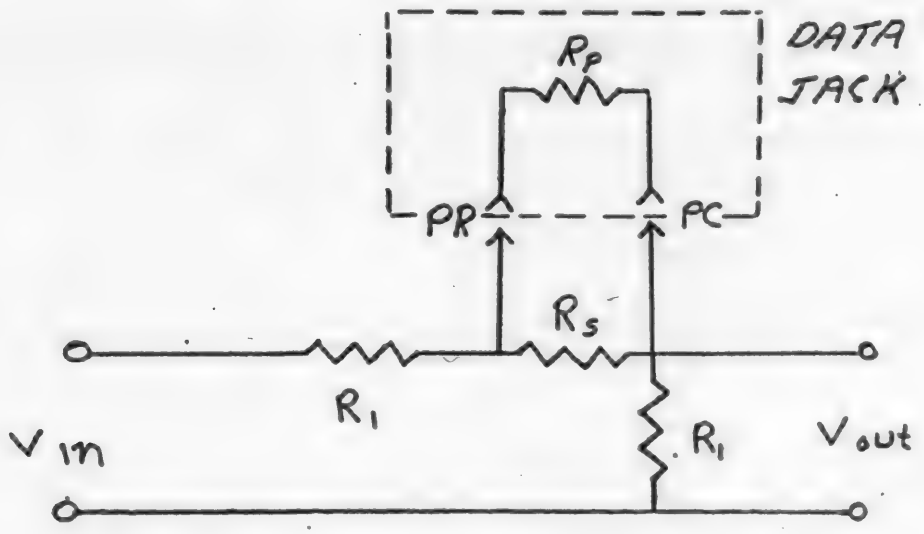
* Tolerance of Rp is ± 1%

** Tolerance of programmed data equipment signal power output is ± 1 dB

APPENDIX A-55

The voltages impressed on resistor Rp by the data equipment shall be such as not to cause power dissipation in Rp in excess of 50 milliwatts.

The circuit shown below was used in calculating values of the programming resistors and may be useful in implementing the automatic control of signal power output in the programmed data equipment.



R1 is the source impedance for the input signal Vin, and also the terminating impedance of the load. R_S is a series resistance, on which the computation of the programming resistor Rp is based. The table of values of Rp is derived for R_1 = 600 ohms
R_S = 3600 ohms

In "universal" configurations, the proper attenuator shall be installed or adjusted by the telephone company at the time of installation, based upon the loop loss of the telephone line, to arrive at the optimum power level of -12 dBm at the central office, with a data device maximum signal power level of -4 dBm.

The switch which is incorporated in "universal" configurations shall be operated to the position appropriate for the type of data equipment which is connected.

APPENDIX A-56

(1) Bridged T/R; 8 position keyed data jack--Universal

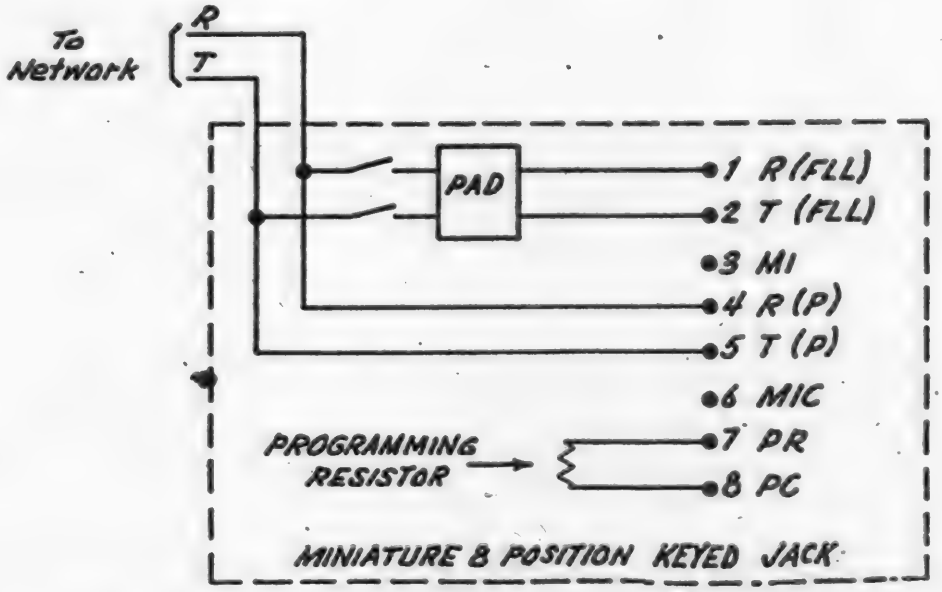
ELECTRICAL NETWORK CONNECTION: Single line bridged tip and ring.

UNIVERSAL SERVICE ORDER CODE: RJ41S

MECHANICAL ARRANGEMENT: Single miniature 8 position keyed jack for surface mounting.

TYPICAL USAGE: Universal jack for fixed loss loop (FLL) or programmed (P) types of data equipment.

WIRING DIAGRAM:



Note: This configuration may be used for the connection of data equipment with a key telephone system, with A and Al respectively connected to pins 3 and 6 above, as a substitute for MI and MIC under the following UNIVERSAL SERVICE ORDER CODES:

RJ42S - T/R connected ahead of the line circuit
RJ43S - T/R connected behind the line circuit

For a description of "before" and "behind" the line circuit, refer to Sections 68.502(a)(2) and (a)(3).

APPENDIX A-57

(2) Bridged T/R; 8 position keyed data jack--Programmed

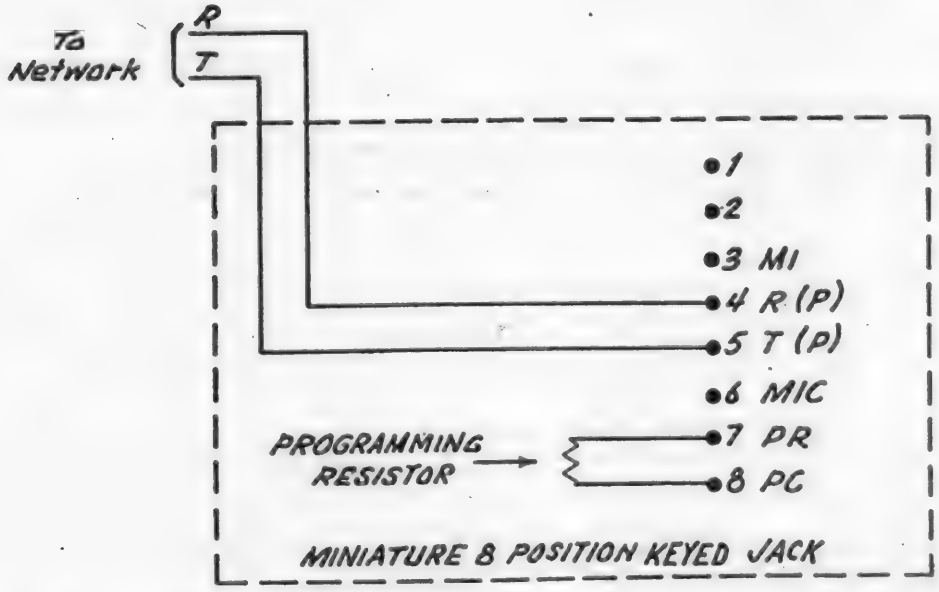
ELECTRICAL NETWORK CONNECTION: Single line bridged tip and ring.

UNIVERSAL SERVICE ORDER CODE: RJ45S

MECHANICAL ARRANGEMENT: Single miniature 8 position keyed jack for surface mounting

TYPICAL USAGE: Programmed data equipment.

WIRING DIAGRAM:



Note: This configuration may be used for the connection of data equipment with a key telephone system, with A and A1 respectively connected to pins 3 and 6 abov as a substitute for MI and MIC under the following UNIVERSAL SERVICE ORDER CODES:

RJ46S - T/R connected ahead of the line circuit
RJ47S - T/R connected behind the line circuit

For a description of "before" and "behind" the line circuit, refer to Sections 68.502(a)(2) and (a)(3).

APPENDIX A-58

(3) Multiple bridged T/R; 8 position keyed data jack--Universal

ELECTRICAL NETWORK CONNECTION: Multiple line bridged tip and ring.

UNIVERSAL SERVICE ORDER CODE: RJ41M

MECHANICAL ARRANGEMENT: Up to 8 miniature 8 position keyed jacks in multiple mounting arrangement.

TYPICAL USAGE: Multiple installations of fixed loss loop or programmed types of data equipment.

WIRING DIAGRAM: Multiple arrangement of Section 68.502(e)(1).

Note: This configuration may be used for the connection of data equipment with a key telephone system, with A and A1 respectively connected to pins 3 and 6, as a substitute for MI and MIC under the following UNIVERSAL SERVICE ORDER CODES:

RJ42M - T/R connected ahead of the line circuit
RJ43M - T/R connected behind the line circuit.

For a description of "before" and "behind" the line circuit, refer to Sections 68.502(a)(2) and (a)(3).

(4) Multiple bridged T/R; 8-position keyed data jack--Programmed

ELECTRICAL NETWORK CONNECTION: Multiple line bridged tip and ring.

UNIVERSAL SERVICE ORDER CODE: RJ45M

MECHANICAL ARRANGEMENT: Up to 8 miniature 8 position keyed jacks in multiple mounting arrangement

TYPICAL USAGE: Multiple installations of programmed types of data equipment.

WIRING DIAGRAM: Multiple arrangement of Section 68.502(e)(2).

Note: This configuration may be used for the connection of data equipment with a key telephone system, with A and A1 respectively connected to pins 3 and 6, as a substitute for MI and MIC under the following UNIVERSAL SERVICE ORDER CODES:

RJ46M - T/R connected ahead of the line circuit
RJ47M - T/R connected behind the line circuit

For a description of "before" and "behind" the line circuit, refer to Sections 68.502(a)(2) and (a)(3)

APPENDIX A-59

(5) Bridged T/R; 50 position ribbon jack--Universal

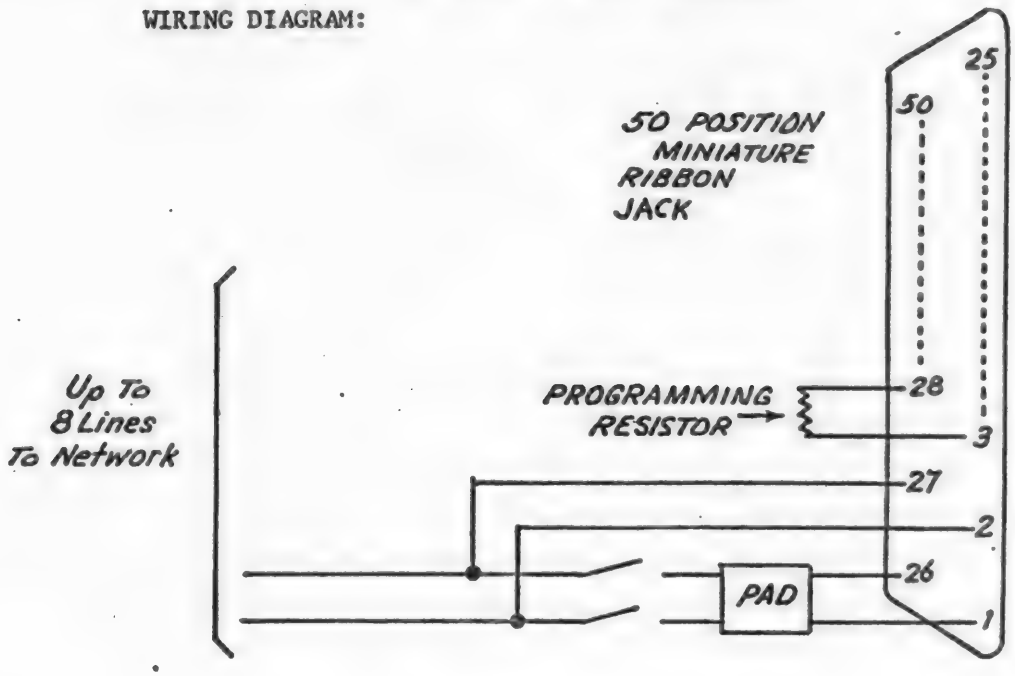
ELECTRICAL NETWORK CONNECTION: Single or multiple line bridged tip and ring.

UNIVERSAL SERVICE ORDER CODE: RJ26X

MECHANICAL ARRANGEMENT: 50 position miniature ribbon jack.

TYPICAL USAGE: Universal jack for fixed loss loop (FLL) or programmed (P) types of data equipment.

WIRING DIAGRAM:



	Position					
	FLL		P			
Line	T	R	T	R	PR	PC
1	26	1	27	2	28	3
2	29	4	30	5	31	6
3	32	7	33	8	34	9
4	35	10	36	11	37	12
5	38	13	39	14	40	15
6	41	16	42	17	43	18
7	44	19	45	20	46	21
8	47	22	48	23	49	24

Note: At the time the jack is ordered, the customer shall specify the number of and sequence of central office lines to be connected to the jack. The telephone company will consecutively wire these lines to the jack in accordance with the table above, without skipping any positions.

APPENDIX A-60

(6) Bridged T/R; 50 position ribbon jack--Programmed

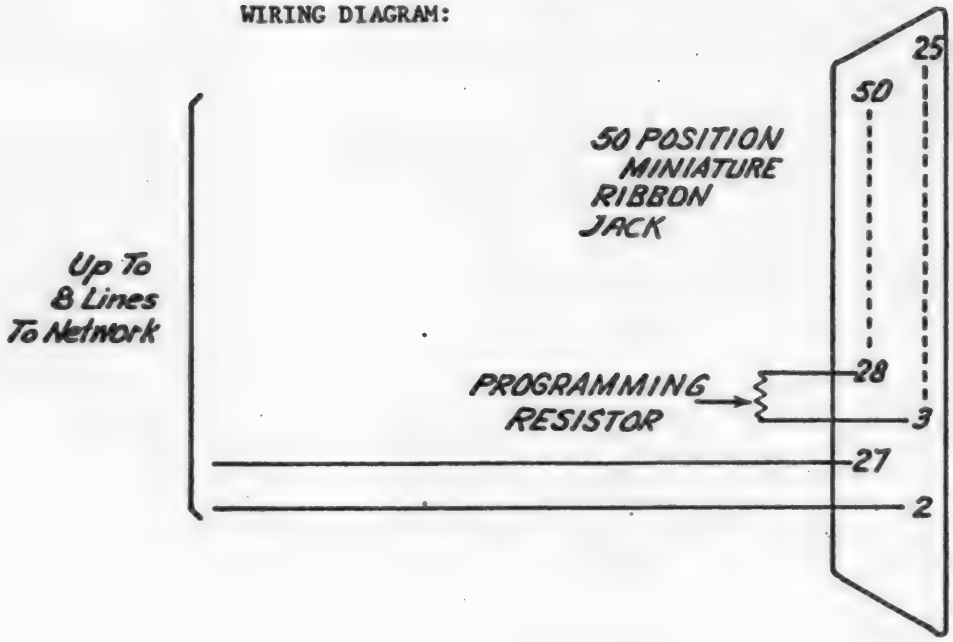
ELECTRICAL NETWORK CONNECTION: Single or multiple line bridged tip and ring.

UNIVERSAL SERVICE ORDER CODE: RJ27X

MECHANICAL ARRANGEMENT: 50 position miniature ribbon jack.

TYPICAL USAGE: Programmed jack for programmed (P) types of data equipment.

WIRING DIAGRAM:



	Position			
	P			
Line	T	R	PR	PC
1	27	2	28	3
2	30	5	31	6
3	33	8	34	9
4	36	11	37	12
5	39	14	40	15
6	42	17	43	18
7	45	20	46	21
8	48	23	49	24

Note: At the time the jack is ordered, the customer shall specify the number of and sequence of central office lines to be connected to the jack. The telephone company will consecutively wire these lines to the jack in accordance with the table above, without skipping any positions.

(7) Bridged T/R with A/A1 and Mode Indication; 50 position ribbon jack--Universal

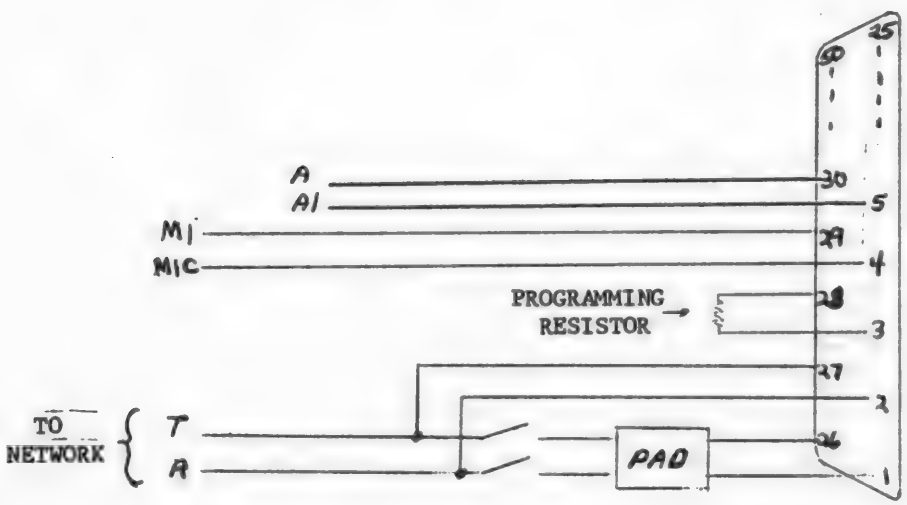
ELECTRICAL NETWORK CONNECTION: Single line bridged tip and ring, connected either before or behind the line circuit of a key telephone system (depending upon USOC selected) with A and A1 leads and Mode Indication.

UNIVERSAL SERVICE ORDER CODES (USOC):
RJ51X -- T/R connected ahead of the line circuit
RJ52X -- T/R connected behind the line circuit
For a description of "before" and "behind" the line circuit, refer to Sections 68.502(a)(2) and (a)(3).

MECHANICAL ARRANGEMENT: 50 position miniature ribbon jack.

TYPICAL USAGE: Universal jack for fixed loss loop (FLL) or programmed (P) types of data equipment requiring both Mode Indication function and A/A1 connections to a key telephone system. This configuration will normally be used in conjunction with RJ36X series configuration (Section 68.502(b)(6)).

WIRING DIAGRAM:



APPENDIX A-62

(8) Bridged T/R with A/Al and Mode Indication; 50 position ribbon jack--Programmed

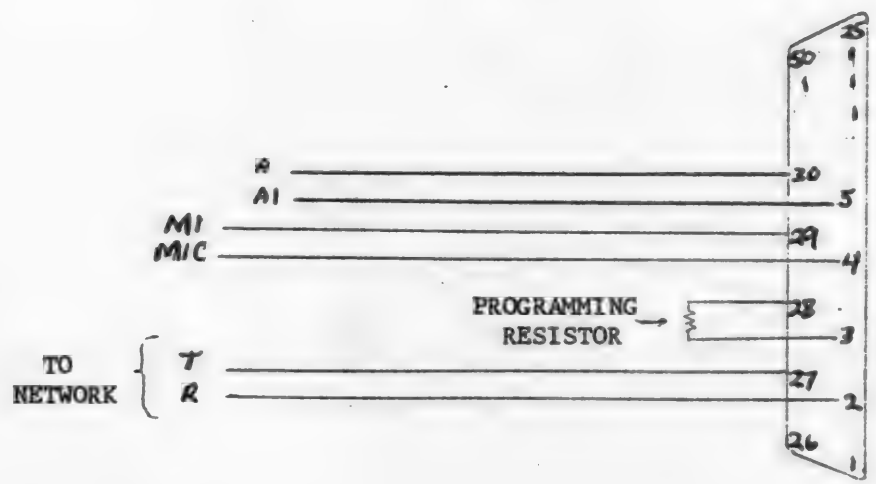
ELECTRICAL NETWORK CONNECTION: Single line bridged tip and ring, connected either before or behind the line circuit of a key telephone system (depending upon USOC selected) with A and Al leads and Mode Indication.

UNIVERSAL SERVICE ORDER CODES (USOC):
RJ53X -- T/R connected ahead of the line circuit
RJ54X -- T/R connected behind the line circuit
For a description of "before" and "behind" the line circuit refer to Sections 68.502(a)(2) and (a)(3).

MECHANICAL ARRANGEMENT: 50 position miniature ribbon jack.

TYPICAL USAGE: Programmed jack for programmed (P) types of data equipment requiring both Mode Indication function and A/Al connections to a key telephone system. This configuration will normally be used in conjunction with RJ36X series configuration (Section 68.502(b)(6)).

WIRING DIAGRAM:



APPENDIX A-63

(f) Multiple-line series configurations.

(1) Up to eight 8 position series jacks. Multiple series jacks in this category consist of multiple arrangements of configurations specified in sub-section (b) of this Section, in a multiple mounting arrangement. Such multiple arrangements may be ordered as a unit under the following UNIVERSAL SERVICE ORDER CODES:

RJ31M - multiple series T/R ahead of all station equipment (reference Section 68.502(b)(1)).
RJ32M - multiple series T/R at station (reference Section 68.502(b)(2)).
RJ33M - multiple series T/R ahead of the line circuits of a key telephone system, with A/Al (reference Section 68.502(b)(3)).
RJ34M - multiple series T/R behind the line circuits of a key telephone system, with A/Al (reference Section 68.502(b)(4)).
RJ35M - multiple series T/R behind the line circuits leading to one key telephone station instrument of a key telephone system, with A/Al.

Note: RJ34M and RJ35M differ in that RJ34M is installed before all instruments connected with a key telephone system, while RJ35M is installed before one instrument connected with a key telephone system.

(2) [Reserved]

APPENDIX A-64

Section 68.504 Adapters.

(a) Adapters between non-standard jacks and standard plugs. Certain non-standard jacks and plugs are in use in various telephone company service areas. To permit rapid connection of registered telephone equipment, which will be terminated in a standard plug, to these pre-existing non-standard jacks, without the necessity for a new installation of standard jacks, adapters may be interposed between the pre-existing jacks and registered telephone equipment. Such adapters may be provided either by the telephone company, or by the customer, at the customer's option.

(1) Adapter between non-standard square-array 4 pin jack and standard 6 position plug.

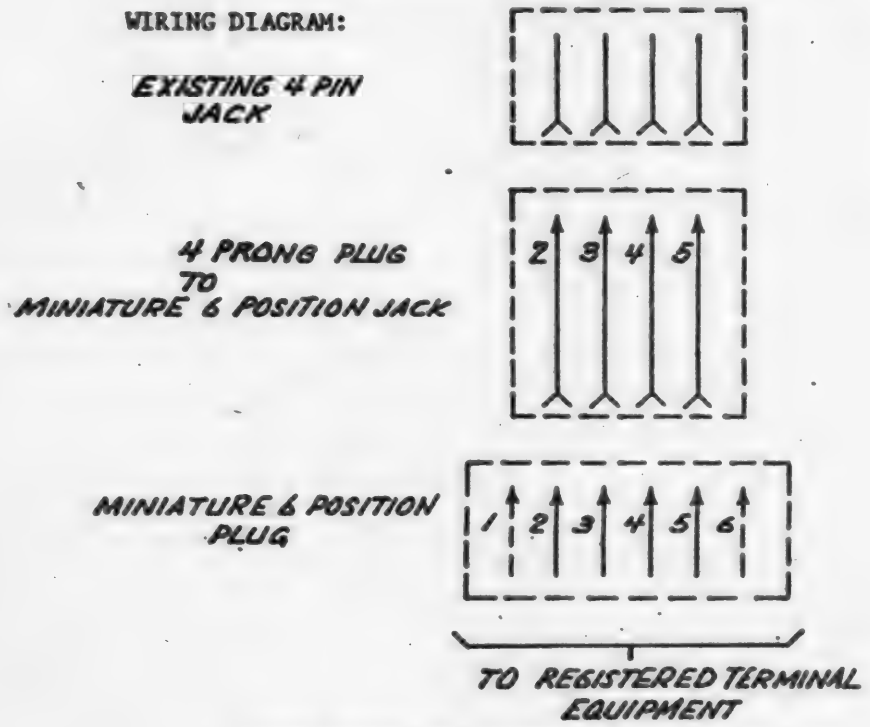
ELECTRICAL NETWORK CONNECTION: Single line bridged tip and ring (and A/A1 if the existing 4 pin jack has these leads terminated). This adapter will not be equipped with conductors 1 and 6. Conductors 2 and 5 are reserved for telephone company use except when providing A/A1 leads.

UNIVERSAL SERVICE ORDER CODE: RJA1X

MECHANICAL ARRANGEMENT: Miniature 6 position jack to 4 pin plug-adapter.

TYPICAL USAGE: Single line non-key telephone sets or ancillary devices where a working 4 pin jack exists and the registered terminal equipment is equipped with a miniature 6 position plug.

WIRING DIAGRAM:



APPENDIX A-65

(2) Adapter between non-standard 12 pin jack and standard 6 position plug.

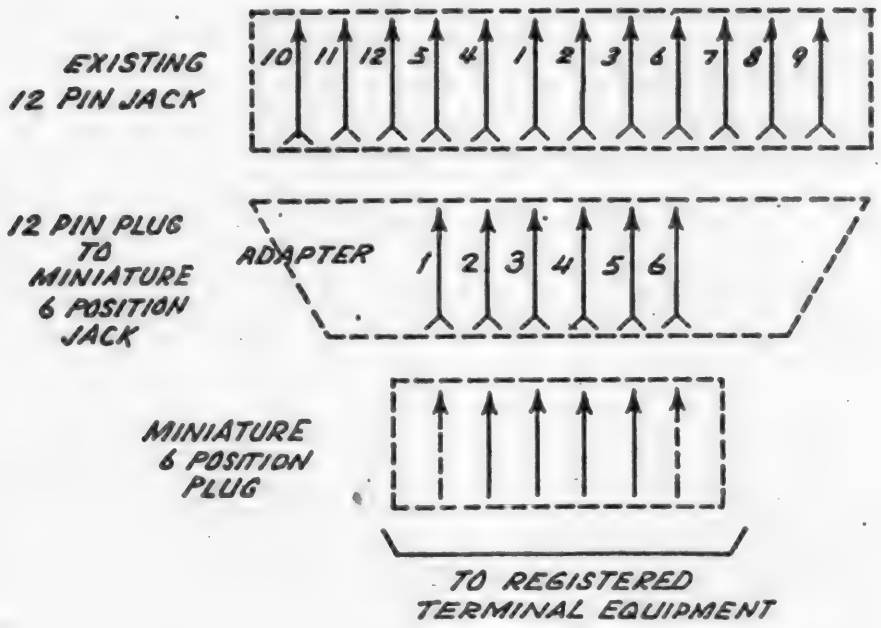
ELECTRICAL NETWORK CONNECTION: Single line bridged tip and ring (A and A1 if existing 12 pin jack has these leads terminated). Conductors 1, 2, 5 and 6 are reserved for telephone company use except when providing A and A1 leads.

UNIVERSAL SERVICE ORDER CODE (USOC): RJA3X

MECHANICAL ARRANGEMENT: Miniature 6 position jack to 12 pin jack-adapter.

TYPICAL USAGE: Single line non-key telephone set or ancillary devices where a working 12 pin jack exists and the registered terminal equipment is equipped with a miniature 6 position plug.

WIRING DIAGRAM:


EXISTING 12 PIN JACK
10 11 12 5 4 1 2 3 6 7 8 9
12 PIN PLUG TO MINIATURE 6 POSITION JACK
ADAPTER
1 2 3 4 5 6
MINIATURE 6 POSITION PLUG
TO REGISTERED TERMINAL EQUIPMENT

APPENDIX A-66

(3) Adapter between non-standard retangular-array 6 pin jack and standard 6 position plug.

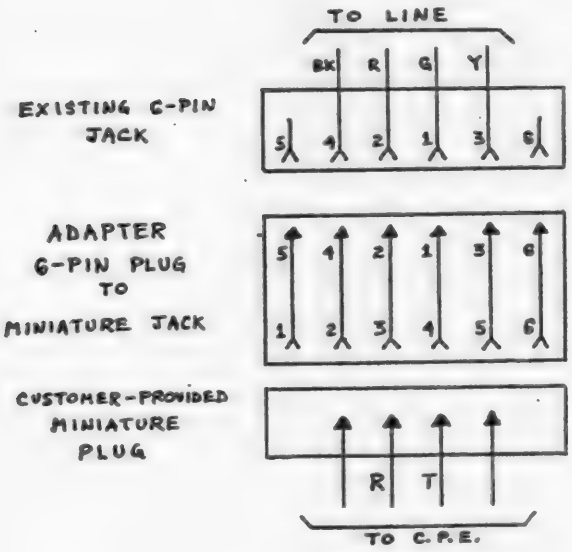
ELECTRICAL NETWORK CONNECTION: Single line bridged tip and ring (A and A1 if existing jack has these leads terminated). Conductors 2 and 5 are reserved for telephone company use except when providing A and A1 leads.

UNIVERSAL SERVICE ORDER CODE: RJ4X

MECHANICAL ARRANGEMENT: Miniature 6 position jack to 6-pin .

TYPICAL USAGE: Single line non-key telephone sets or ancillary devices where a working rectangular-array jack exists and the registered terminal equipment is equipped with a miniature 6 position plug.

WIRING DIAGRAM:



APPENDIX A-67

(b) Adapters between one standard 6 position jack and two standard 6 position plugs ("cube tap" or "T" adapter). To permit rapid connection of registered telephone equipment to pre-existing standard jacks, without the necessity for new or additional installation of standard jacks, these adapters may be interposed between pre-existing jacks and registered equipment. Such adapters may be provided either by the telephone company, or by the customer, at the customer's option.

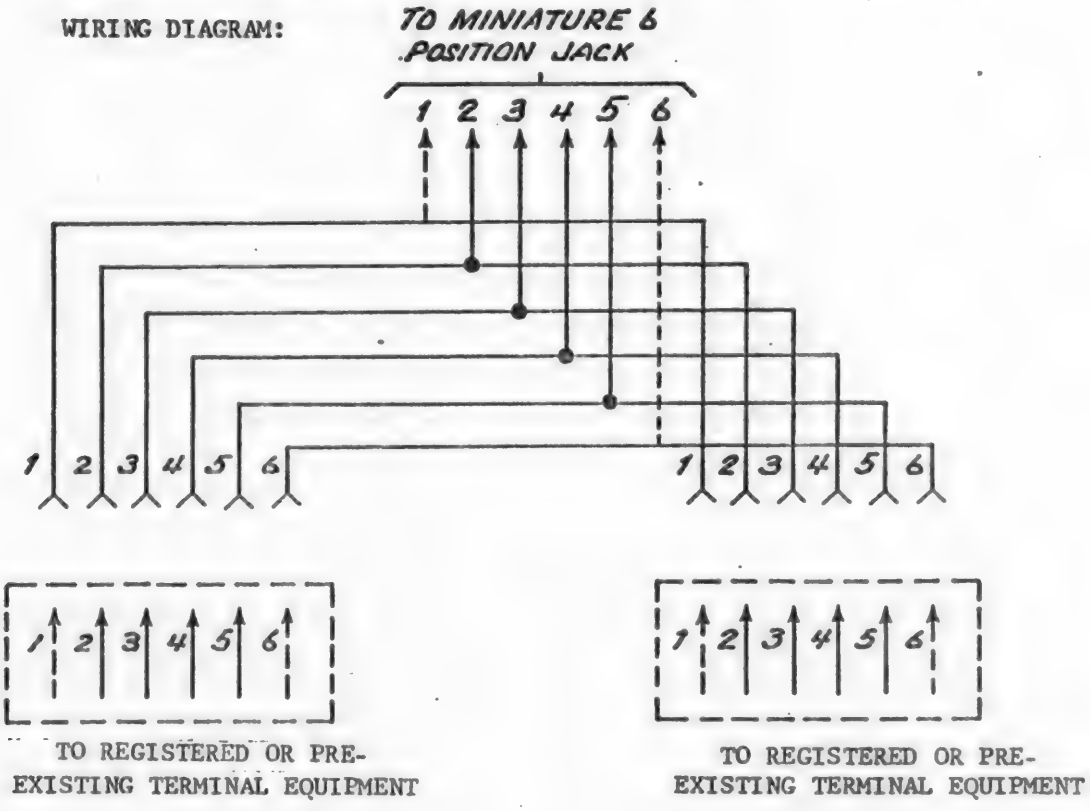
ELECTRICAL NETWORK CONNECTION: Single line bridged tip and ring (A and A1 if existing 6 position jack has these leads terminated). Conductors 2 and 5 are reserved for telephone company use except when providing A and A1 leads.

UNIVERSAL SERVICE ORDER CODE: RJA2X

MECHANICAL ARRANGEMENT: Miniature 6 position plug to duplex miniature 6 position jacks-adapter.

TYPICAL USAGE: Single line non-key telephone set or ancillary device where a working miniature 6 position jack exists.

WIRING DIAGRAM:


TO MINIATURE 6 POSITION JACK
1 2 3 4 5 6
1 2 3 4 5 6
1 2 3 4 5 6
1 2 3 4 5 6
TO REGISTERED OR PRE-EXISTING TERMINAL EQUIPMENT
TO REGISTERED OR PRE-EXISTING TERMINAL EQUIPMENT

Unilat.-Corp.-US pats.—020173—1

UNILATERAL

PATENT LICENSE AGREEMENT

Effective as of
WESTERN ELECTRIC COMPANY, INCORPORATED, a New York corporation ("WESTERN"), having an office at 222 Broadway, New York, New York 10038, and

("the CORPORATION"), having an office at

agree as follows:

ARTICLE I

DEFINITIONS

1.01 Terms in this agreement (other than technical terms, names of parties, companies and Article headings) which are in capital letters shall have the meanings specified in the General Definitions Appendix, and technical terms in this agreement which are in capital letters shall have the meanings specified in the Technical Definitions Appendix.

ARTICLE II

GRANTS OF LICENSES AND IMMUNITIES

2.01 WESTERN grants to the CORPORATION under WESTERN'S PATENTS nonexclusive licenses for products of the following kinds:

2.02 All licenses herein granted shall commence on the effective date

Unilat.-Corp.-US pats.—020173-100675—2

hereof and, except as provided in Article V and notwithstanding the expiration of the FIVE YEAR PERIOD, shall continue for the entire terms that the patents under which they are granted are in force or for that part of such terms for which WESTERN has the right to grant such licenses.

2.03 WESTERN grants under all patents issued in countries other than the United States and owned or controlled by AMERICAN TELEPHONE AND TELEGRAPH COMPANY, a New York corporation ("AT&T"), WESTERN or their SUBSIDIARIES, royalty-free immunity relating to the sale, lease or use in, or the importation into, such other countries of LICENSED PRODUCTS, and maintenance parts therefor, manufactured under the licenses granted under WESTERN'S PATENTS; provided, however, that nothing in this Section 2.03 shall relieve the CORPORATION of its obligation to pay any royalty which may be predicated upon such manufacture of any such LICENSED PRODUCT or part, whether or not the first sale, lease or use thereof occurs outside of the United States.

2.04 The licenses granted for LICENSED PRODUCTS are licenses to make, have made, use, lease and sell such LICENSED PRODUCTS. Such licenses include the rights to maintain LICENSED PRODUCTS, to practice methods and processes involved in the use of LICENSED PRODUCTS and to make and have made, to use and have used, and to maintain machines, tools, materials and other instrumentalities, and to use and have used methods and processes, insofar as such machines, tools, materials, other instrumentalities, methods and processes are involved in or incidental to the development, manufacture, installation, testing or repair of LICENSED PRODUCTS.

2.05 The grant of each license to the CORPORATION includes the right to grant sublicenses within the scope of such license to its SUBSIDIARIES. Such right may be exercised at any time prior to termination or cancellation of the corresponding license under the provisions of Article V. Any such sublicenses granted to any present SUBSIDIARY may be made effective, retroactively, as of the effective date hereof, and any such sublicenses granted to any future SUBSIDIARY may be made effective, retroactively, as of the date such company became a SUBSIDIARY.

2.06 It is recognized that WESTERN or any of its ASSOCIATED COMPANIES may have entered into or may hereafter enter into a contract with a national government to do development work financed by such government and may be required under such contract (either unconditionally or by reason of any action or inaction thereunder) to assign to such government its rights to grant, or may now or hereafter be restrained by such government from granting, licenses or immunities to others than its ASSOCIATED COMPANIES under patents for inventions arising out of such work or covered by such contract. The resulting inability of WESTERN to grant the licenses or immunities purported to be granted by it under patents for such inventions shall not be considered to be a breach of this agreement, if

(i) such contract is for the benefit of such government's military or national defense establishment or the Energy Research and Development Administration of the United States Government or the National Aeronautics and Space Administration of the United States Government, or

(ii) in cases other than (i), such contract is with the United States Government or any agency of and within such Government, and any such requirement or restraint is pursuant to a statute or officially promulgated regulation of such Government or agency applicable to such contract;

provided, however, that

(iii) WESTERN (or, if an ASSOCIATED COMPANY thereof has entered into such contract, such ASSOCIATED COMPANY) shall exert its best efforts to enable WESTERN to grant the licenses or immunities herein purported to be granted by it under such patents; and

(iv) within ninety (90) days after the filing of any application for any such patent, WESTERN shall give written notice to the other party identifying such application by country, number and date of filing.

For the purposes of this Section 2.06, AT&T, WESTERN and their ASSOCIATED COMPANIES shall all be deemed to be ASSOCIATED COMPANIES of one another.

ARTICLE III

ROYALTY

3.01 The CORPORATION shall pay to WESTERN royalty, at the applicable rate hereinafter specified, on each LICENSED PRODUCT, and maintenance part therefor, which is a ROYALTY-BEARING PRODUCT, and

(i) which is sold, leased or put into use by the CORPORATION or any of its SUBSIDIARIES while any license acquired hereunder by the CORPORATION with respect to such ROYALTY-BEARING PRODUCT shall remain in force, or

(ii) which is made by or for the CORPORATION or any of its SUBSIDIARIES while any such license shall remain in force and is thereafter sold, leased or put into use by the CORPORATION or any of its SUBSIDIARIES,

whether or not such SUBSIDIARIES are sublicensed pursuant to Section 2.05, such royalty rate to be applied, except as provided in Section 3.05, to the NET SELLING PRICE of such ROYALTY-BEARING PRODUCT if sold for a separate consideration payable wholly in money and in all other cases to the FAIR MARKET VALUE thereof. The royalty rates applicable to LICENSED PRODUCTS of the kinds specified in Section 2.01, and maintenance parts therefor, are as follows:

(iii)

3.02 If a LICENSED PRODUCT is a ROYALTY-BEARING PRODUCT solely on account of one or a limited number of WESTERN'S PATENTS, the

CORPORATION may elect to reduce the amount of royalty otherwise payable hereunder on said LICENSED PRODUCT by a royalty reduction percentage, and as of an effective date, established by WESTERN. Upon written request from the CORPORATION identifying the LICENSED PRODUCT and each relevant patent, WESTERN will inform the CORPORATION of the royalty reduction percentage applicable in respect of said LICENSED PRODUCT and patent or patents and the effective date thereof.

3.03 A LICENSED PRODUCT, or maintenance part therefor, which is made and sold by the CORPORATION or any of its SUBSIDIARIES and which is a ROYALTY-BEARING PRODUCT hereunder on account of one or more of WESTERN'S PATENTS, may be treated by the CORPORATION as not licensed and not subject to royalty hereunder if all of the following conditions are met:

(i) the purchaser is licensed under the same patent or patents, pursuant to another agreement, to have said LICENSED PRODUCT or part made;

(ii) the purchaser expressly advises the CORPORATION or its SUBSIDIARY, whichever effects the making and sale, in writing at or prior to (but in no event later than) the time of such sale that, in purchasing said LICENSED PRODUCT or part, it is exercising its own license or licenses under said patent or patents to have said LICENSED PRODUCT or part made; and

(iii) the CORPORATION retains such written advice and makes it available to WESTERN at the latter's request.

3.04 Only one royalty shall be payable hereunder in respect of any ROYALTY-BEARING PRODUCT. Royalty shall accrue hereunder on any LICENSED PRODUCT, or maintenance part therefor, upon its first becoming a ROYALTY-BEARING PRODUCT, and the royalty thereon shall become payable in accordance with the provisions of this Article III upon the first sale, lease or putting into use thereof.

3.05 If any sale of a ROYALTY-BEARING PRODUCT shall be made by the CORPORATION or a SUBSIDIARY thereof to

(i) any company of which the CORPORATION is a SUBSIDIARY at the time of such sale, or

(ii) the CORPORATION or a SUBSIDIARY thereof or any other SUBSIDIARY of a company of which the CORPORATION is a SUBSIDIARY at the time of such sale,

royalty payable hereunder shall be computed on the FAIR MARKET VALUE of such ROYALTY-BEARING PRODUCT.

ARTICLE IV

REPORTS AND PAYMENTS

4.01 The CORPORATION shall keep full, clear and accurate records with respect to ROYALTY-BEARING PRODUCTS. WESTERN shall have the right through its accredited auditing representatives to make an examination and audit, during normal business hours, not more frequently than annually, of all such records and such other records and accounts as may under recognized accounting practices contain information bearing upon the amount of royalty payable to it under this agreement. Prompt adjustment shall be made by the proper party to compensate for any errors or omissions disclosed by such examination or audit. Neither such right to examine and audit nor the right to receive such adjustment shall be affected by any statement to the contrary, appearing on checks or otherwise, unless such statement appears in a letter, signed by the party having such right and delivered to the other party, expressly waiving such right. */

4.02 (a) Within sixty (60) days after the end of each semiannual period ending on June 30th or December 31st, commencing with the semiannual period during which this agreement first becomes effective, the CORPORATION shall furnish to WESTERN a statement, in form acceptable to WESTERN, certified by a responsible official of the CORPORATION:

(i) showing all ROYALTY-BEARING PRODUCTS, by kinds of LICENSED PRODUCTS, which were sold, leased or put into use during such semiannual period, the NET SELLING PRICES of such ROYALTY-BEARING PRODUCTS or (where royalty is based on FAIR MARKET VALUES) the FAIR MARKET VALUES thereof and the amount of royalty payable thereon (or if no such ROYALTY-BEARING PRODUCT has been so sold, leased or put into use, showing that fact);

(ii) identifying, if royalty is reduced under provisions of Section 3.02, each LICENSED PRODUCT by its type and the patent or patents involved in such royalty reduction;

(iii) showing, by purchasers and kinds of LICENSED PRODUCTS, the monetary totals of the sales, to each purchaser exercising its own "to have made" license or licenses, of LICENSED PRODUCTS and maintenance parts in transactions of the character described in Section 3.03; and

(iv) identifying all transactions of the character described in Section 3.05.

(b) Within such sixty (60) days the CORPORATION shall, irrespective of its own business and accounting methods, pay to WESTERN the royalties payable for such semiannual period.

(c) Notwithstanding the provisions of Section 6.03(a) (v), the CORPORATION shall furnish whatever additional information WESTERN may

*/ If licensee insists on a non-Western auditor, third line, insert, after 'representatives", -or, at the election of the CORPORATION, through a firm of certified public accountants proposed by WESTERN and accepted by the CORPORATION-.

reasonably prescribe from time to time to enable WESTERN to ascertain which LICENSED PRODUCTS (and maintenance parts therefor) sold, leased or put into use by the CORPORATION or any of its SUBSIDIARIES are subject to the payment of royalty to WESTERN, and the amount of royalty payable thereon.

4.03 Royalty payments provided for in this agreement shall, when overdue, bear interest at an annual rate of one percent (1%) over the prime rate or successive prime rates in effect in New York City during delinquency.

4.04 Payment to WESTERN shall be made in United States dollars to WESTERN'S Treasury Organization at 222 Broadway, New York, New York 10038, or at such changed address as WESTERN shall have specified by written notice. If any royalty for any semiannual period referred to in Section 4.02 is computed in other currency, conversion to United States dollars shall be at the prevailing rate for bank cable transfers on New York City as quoted for the last day of such semiannual period by leading banks dealing in the New York City foreign exchange market.

ARTICLE V

TERMINATION, CANCELLATION AND SURRENDER

5.01 (a) If the CORPORATION shall fail to fulfill one or more of its obligations under ARTICLES III or IV, WESTERN may, upon election and in addition to any other remedies that it may have, at any time terminate all licenses and rights granted to the CORPORATION hereunder, by not less than six (6) months' written notice to the CORPORATION specifying any such breach, unless within the period of such notice all breaches specified therein shall have been remedied.

(b) Termination by WESTERN of licenses and rights granted to the CORPORATION shall terminate the obligations of the CORPORATION under the provisions of Articles III and IV relating to such terminated licenses and rights, except such obligations as to ROYALTY-BEARING PRODUCTS made, sold, leased or put into use prior to such termination.

5.02 By written notice to WESTERN, the CORPORATION may cancel the licenses for any specified products granted hereunder to it under WESTERN'S PATENTS. Such cancellation shall be effective as of the date of giving said notice but shall not relieve the CORPORATION of its obligation to pay accrued royalties with respect to such specified products.

5.03 By written notice to WESTERN, specifying any of WESTERN'S PATENTS by number and date of issuance, the CORPORATION may surrender and terminate all licenses and rights granted to it under such specified patent or patents or under any specified invention or inventions thereof. Such surrender and termination shall be effective as of a date specified in said notice which shall not be more than six (6) months prior to the date of giving said notice. As of said effective date, such specified patent or patents or invention or inventions shall cease to be among, or among the inventions of, WESTERN'S PATENTS for the purposes of this agreement without affecting obligations in respect of royalties accrued prior to said effective date.

5.04 (a) Every sublicense granted by the CORPORATION shall terminate with termination or cancellation of its corresponding license.

(b) Any sublicenses granted shall terminate if and when the grantee thereof ceases to be a SUBSIDIARY of the CORPORATION. Each LICENSED PRODUCT and each maintenance part, made by or for a SUBSIDIARY of the CORPORATION, and on which royalty has accrued but which remains not sold, leased or put into use at the time such SUBSIDIARY ceases to be a SUBSIDIARY of the CORPORATION, shall be deemed to have been put into use by such SUBSIDIARY immediately prior to such time at the place said LICENSED PRODUCT or part is then located.

5.05 Licenses, immunities and rights with respect to each LICENSED PRODUCT, and each maintenance part, made, sold, leased or put into use prior to any termination or cancellation under the provisions of this Article V shall survive such termination or cancellation.

ARTICLE VI

MISCELLANEOUS PROVISIONS

6.01 (a) WESTERN shall, upon written request from the CORPORATION sufficiently identifying any patent by country, number and date of issuance, inform the CORPORATION as to the extent to which any such patent is subject to the licenses, immunities and rights granted to the CORPORATION.

(b) If such licenses, immunities or rights under any such patent are restricted in scope, copies of all pertinent provisions of any contract (other than provisions of a contract with a government to the extent that disclosure thereof is prohibited under that government's laws or regulations) creating such restrictions shall, upon request, be furnished to the CORPORATION.

6.02 Upon written request from the CORPORATION, WESTERN shall inform the CORPORATION which of WESTERN'S PATENTS cover inventions under which the United States Government holds a royalty-free license.

6.03 (a) Nothing contained in this agreement shall be construed as

(i) requiring the filing of any patent application, the securing of any patent or the maintaining of any patent in force; or

(ii) a warranty or representation by WESTERN as to the validity or scope of any patent; or

(iii) a warranty or representation that any manufacture, sale, lease, use or importation will be free from infringement of patents other than those under which and to the extent to which licenses or immunities are in force hereunder; or

(iv) an agreement to bring or prosecute actions or suits against third parties for infringement; or

(v) an obligation to furnish any manufacturing or technical information or assistance; or

(vi) conferring any right to use, in advertising, publicity or otherwise, any name, trade name or trademark, or any contraction, abbreviation or simulation thereof; or

(vii) conferring by implication, estoppel or otherwise upon the

CORPORATION any license or other right under any patent, except the licenses and rights expressly granted to the CORPORATION; or

(viii) an obligation upon WESTERN to make any determination as to the applicability of any patent to any product of the CORPORATION or any of its SUBSIDIARIES; or

(ix) a release for any infringement prior to the effective date hereof.

(b) Neither WESTERN nor AT&T makes any representations, extends any warranties of any kind or assumes any responsibility whatever with respect to the manufacture, sale, lease, use or importation of any LICENSED PRODUCT, or part therefor, by the CORPORATION, any of its SUBSIDIARIES, or any direct or indirect supplier or vendee or other transferee of any such company, other than the licenses, immunities and rights expressly herein granted.

6.04 Neither this agreement nor any licenses or rights hereunder, in whole or in part, shall be assignable or otherwise transferable.

6.05 Any notice, request or information shall be deemed to be sufficiently given when sent by registered mail addressed to the addressee at its office above specified (and when addressed to WESTERN, to the attention of its Patent Licensing Organization) and any royalty statement shall be deemed to be sufficiently furnished when sent by registered mail addressed to WESTERN'S Treasury Organization at 222 Broadway, New York, New York 10038, or at such changed address as the addressee shall have specified by written notice.

6.06 This agreement sets forth the entire agreement and understanding between the parties as to the subject matter hereof and merges all prior discussions between them, and neither of the parties shall be bound by any conditions, definitions, warranties, understandings or representations with respect to such subject matter other than as expressly provided herein, or in any prior existing written agreement between the parties, or as duly set forth on or subsequent to the effective date hereof in writing and signed by a proper and duly authorized representative of the party to be bound thereby.

6.07 The construction and performance of this agreement shall be governed by the law of the State of New York.

IN WITNESS WHEREOF, each of the parties has caused this agreement to be executed in duplicate originals by its duly authorized representatives on the respective dates entered below.

WESTERN ELECTRIC COMPANY, INCORPORATED

By .....
Director of Patent Licensing

Date .....

Attest:

[SEAL]

.....
Secretary

.....

By .....

Title .....

Date .....

Attest:

[SEAL]

.....
Secretary

GENERAL DEFINITIONS APPENDIX

FAIR MARKET VALUE means the NET SELLING PRICE which the CORPORATION or any of its SUBSIDIARIES, whichever effects the sale, lease or use of the product or maintenance part, would realize from an unaffiliated buyer in an arm's length sale of an identical product or maintenance part in the same quantity and at the same time and place as such sale, lease or use.

FIVE YEAR PERIOD means the period commencing on the effective date of this agreement and having a duration of five years.

LICENSED PRODUCT means

(i) any product as such, or

(ii) any product which is any specified combination,

of the kinds listed in Section 2.01 of this agreement. Although the term does not mean, and although licenses are not granted for, any other combination, a LICENSED PRODUCT

(iii) shall not lose its status as such on account of, and

(iv) shall not cause an unlicensed combination to infringe WESTERN'S PATENTS solely on account of,

such LICENSED PRODUCT being made, sold, leased or put into use as part of an unlicensed combination.

NET SELLING PRICE means the gross selling price of the ROYALTY-BEARING PRODUCT in the form in which it is sold, whether or not assembled (and without excluding therefrom any components or subassemblies thereof, whatever their origin and whether or not patent impacted), less the following items but only insofar as they pertain to the sale of such ROYALTY-BEARING PRODUCT by the CORPORATION or any of its SUBSIDIARIES and are included in such gross selling price:

(i) usual trade discounts actually allowed (other than cash discounts, advertising allowances, or fees or commissions to any employees of the CORPORATION, a SUBSIDIARY of the CORPORATION, a company of which the CORPORATION is a SUBSIDIARY at the time of the sale, or any other SUBSIDIARY of a company of which the CORPORATION is a SUBSIDIARY at the time of such sale);

(ii) packing costs;

(iii) import, export, excise and sales taxes, and customs duties;

(iv) costs of insurance and transportation from the place of manufacture

to the customer's premises or point of installation;

(v) costs of installation at the place of use; and

(vi) costs of special engineering services not incident to the design or manufacture of the ROYALTY-BEARING PRODUCT.

ROYALTY-BEARING PRODUCT means any LICENSED PRODUCT, and any maintenance part therefor,

(i) which upon manufacture includes, or the manufacture of which employs, any invention of any of WESTERN'S PATENTS in force at the time and place of such manufacture, or

(ii) which includes when sold, leased or put into use, or the use of which employs, any invention of any of WESTERN'S PATENTS in force at the time and place of such sale, lease or use,

other than

(iii) inventions under which the United States Government holds a royalty-free license if such LICENSED PRODUCT or part is contracted for, directly or indirectly, by the United States Government, or by another national government with funds derived through the Military Assistance Program or otherwise through the United States Government, and

(iv) inventions employed in the manufacture of, or included in, such LICENSED PRODUCT or any original part thereof, or such maintenance part therefor or any original part thereof, by a direct or indirect supplier of the CORPORATION or any of its SUBSIDIARIES, but only to the extent such supplier has exercised its own licenses granted by WESTERN under patents for such inventions to so employ or include said inventions.

SUBSIDIARY means a company the majority of whose stock entitled to vote for election of directors is now or hereafter controlled by the parent company either directly or indirectly, but any such company shall be deemed to be a SUBSIDIARY only so long as such control exists.

WESTERN'S PATENTS means all patents issued at any time in the United States for

(i) inventions made prior to the termination of the FIVE YEAR PERIOD and owned or controlled at any time during the FIVE YEAR PERIOD by AT&T, WESTERN or any of their SUBSIDIARIES,

(ii) inventions made during the FIVE YEAR PERIOD, solely or jointly

with anyone, and in the course of their employment by employees of any such company who are employed to do research, development or other inventive work, and

(iii) any other inventions made prior to the termination of the FIVE YEAR PERIOD, with respect to which and to the extent to which any such company shall at any time during the FIVE YEAR PERIOD have the right to grant the licenses and rights which are herein granted by WESTERN;

provided, however, that said patents do not include those issued for inventions made by employees of any SUBSIDIARY of WESTERN or AT&T exclusively engaged in the performance of contracts with the Energy Research and Development Administration of the United States.

APPENDIX B-8

Unisr. Corp. US pats.--020173-14

TECHNICAL DEFINITIONS APPENDIX

Bilat.-Corp.-US pats.—020173—1

BILATERAL

PATENT LICENSE AGREEMENT

Effective as of

WESTERN ELECTRIC COMPANY, INCORPORATED, a New York corporation ("WESTERN"), having an office at 222 Broadway, New York, New York 10038, and

("the CORPORATION"), having an office at

agree as follows:

ARTICLE I

DEFINITIONS

1.01 Terms in this agreement (other than technical terms, names of parties, companies and Article headings) which are in capital letters shall have the meanings specified in the General Definitions Appendix, and technical terms in this agreement which are in capital letters shall have the meanings specified in the Technical Definitions Appendix.

ARTICLE II

GRANTS OF LICENSES AND IMMUNITIES

2.01 WESTERN grants to the CORPORATION under WESTERN'S PATENTS nonexclusive licenses for products of the following kinds:

2.02 The CORPORATION grants to WESTERN and to AMERICAN

TELEPHONE AND TELEGRAPH COMPANY, a New York corporation ("AT&T"), severally, under the CORPORATION'S PATENTS nonexclusive royalty-free licenses for products of the following kinds:

2.03 All licenses herein granted shall commence on the effective date hereof and, except as provided in Article VI and notwithstanding the expiration of the FIVE YEAR PERIOD, shall continue for the entire terms that the patents under which they are granted are in force or for that part of such terms for which the grantor has the right to grant such licenses.

2.04 (a) WESTERN grants under all patents issued in countries other than the United States and owned or controlled by AT&T, WESTERN or their SUBSIDIARIES, royalty-free immunity relating to the sale, lease or use in, or the importation into, such other countries of LICENSED PRODUCTS, and maintenance parts therefor, manufactured under the licenses granted under WESTERN'S PATENTS; provided, however, that nothing in this Section 2.04(a) shall relieve the CORPORATION of its obligation to pay any royalty which may be predicated upon such manufacture of any such LICENSED PRODUCT or part, whether or not the first sale, lease or use thereof occurs outside of the United States.

(b) The CORPORATION grants under all patents issued in countries other than the United States and owned or controlled by it or its ASSOCIATED COMPANIES, royalty-free immunity relating to the sale, lease or use in, or the importation into, such other countries of LICENSED PRODUCTS, and maintenance parts therefor, manufactured under the licenses granted under the CORPORATION'S PATENTS.

2.03 The licenses granted for LICENSED PRODUCTS are licenses to make, have made, use, lease and sell such LICENSED PRODUCTS. Such licenses include the rights to maintain LICENSED PRODUCTS, to practice methods and processes involved in the use of LICENSED PRODUCTS and to make and have made, to use and have used, and to maintain machines, tools, materials

and other instrumentalities, and to use and have used methods and processes, insofar as such machines, tools, materials, other instrumentalities, methods and processes are involved in or incidental to the development, manufacture, installation, testing or repair of LICENSED PRODUCTS.

2.06 The grant of each license to the CORPORATION includes the right to grant sublicenses within the scope of such license to its SUBSIDIARIES. The grant of each license to WESTERN or AT&T includes the right to grant sublicenses within the scope of such license to its ASSOCIATED COMPANIES. Such right of either party or AT&T may be exercised at any time prior to termination or cancellation of the corresponding license under the provisions of Article VI. Any such sublicenses granted to any present SUBSIDIARY or any present ASSOCIATED COMPANY may be made effective, retroactively, as of the effective date hereof, and any such sublicenses granted to any future SUBSIDIARY or any future ASSOCIATED COMPANY may be made effective, retroactively, as of the date such company became a SUBSIDIARY or an ASSOCIATED COMPANY.

ARTICLE III

ACQUISITION AND WARRANTY

3.01 WESTERN and the CORPORATION shall each acquire rights to inventions made during the FIVE YEAR PERIOD which relate to the subject matter of licenses granted and are made, in the course of their employment, either solely or jointly with anyone, by its or its ASSOCIATED COMPANIES' employees (and in the case of WESTERN'S obligation, by employees of AT&T or its SUBSIDIARIES) who are employed to do research, development or other inventive work, such that each grantee shall, by virtue of this agreement, receive in respect of patents issued for such inventions, licenses and rights of the scope and upon the terms herein provided to be granted to such grantee.

3.02 WESTERN and, except as may be stated in a letter from the CORPORATION to WESTERN referring to this agreement and delivered before or concurrently with the execution hereof by WESTERN, the CORPORATION each warrants that there are no commitments or restrictions which will limit the licenses and rights granted by it under patents issued at any time for inventions owned at any time during the FIVE YEAR PERIOD by it or any of its ASSOCIATED COMPANIES (and in the case of WESTERN'S warranty, by AT&T or any of its SUBSIDIARIES).

3.03 It is recognized that either party or any of its ASSOCIATED COMPANIES may have entered into or may hereafter enter into a contract with a national government to do development work financed by such government and may be required under such contract (either unconditionally or by reason of any action or inaction thereunder) to assign to such government its rights to grant, or may now or hereafter be restrained by such government from granting, licenses or immunities to others than its ASSOCIATED COMPANIES under patents for inventions arising out of such work or covered by such contract. The resulting inability of such party to grant the licenses or immunities purported to be granted by it under patents for such inventions shall not be considered to be a breach of this agreement, if

(i) such contract is for the benefit of such government's military or national defense establishment or the Energy Research and Development Administration of the United States Government or the National Aeronautics and Space Administration of the United States Government, or

(ii) in cases other than (i), such contract is with the United States Government or any agency of and within such Government, and any such requirement or restraint is pursuant to a statute or officially promulgated regulation of such Government or agency applicable to such contract;

provided, however, that

(iii) such party (or, if an ASSOCIATED COMPANY thereof has entered into such contract, such ASSOCIATED COMPANY) shall exert its best efforts to enable such party to grant the licenses or immunities herein purported to be granted by it under such patents; and

(iv) within ninety (90) days after the filing of any application for any such patent, such party shall give written notice to the other party identifying such application by country, number and date of filing.

For the purposes of this Section 3.03, AT&T, WESTERN and their ASSOCIATED COMPANIES shall all be deemed to be ASSOCIATED COMPANIES of one another, and the CORPORATION and its ASSOCIATED COMPANIES shall be deemed to be ASSOCIATED COMPANIES of one another.

ARTICLE IV

ROYALTY

4.01 The CORPORATION shall pay to WESTERN royalty, at the applicable rate hereinafter specified, on each LICENSED PRODUCT, and maintenance part therefor, which is a ROYALTY-BEARING PRODUCT, and

(i) which is sold, leased or put into use by the CORPORATION or any of its SUBSIDIARIES while any license acquired hereunder by the CORPORATION with respect to such ROYALTY-BEARING PRODUCT shall remain in force, or

(ii) which is made by or for the CORPORATION or any of its SUBSIDIARIES while any such license shall remain in force and is thereafter sold, leased or put into use by the CORPORATION or any of its SUBSIDIARIES,

whether or not such SUBSIDIARIES are sublicensed pursuant to Section 2.06, such royalty rate to be applied, except as provided in Section 4.05, to the NET SELLING PRICE of such ROYALTY-BEARING PRODUCT if sold for a separate consideration payable wholly in money and in all other cases to the FAIR MARKET VALUE thereof. The royalty rates applicable to LICENSED PRODUCTS of the kinds specified in Section 2.01, and maintenance parts therefor, are as follows:

(iii)

4.02 If a LICENSED PRODUCT is a ROYALTY-BEARING PRODUCT solely on account of one or a limited number of WESTERN'S PATENTS, the

CORPORATION may elect to reduce the amount of royalty otherwise payable hereunder on said LICENSED PRODUCT by a royalty reduction percentage, and as of an effective date, established by WESTERN. Upon written request from the CORPORATION identifying the LICENSED PRODUCT and each relevant patent, WESTERN will inform the CORPORATION of the royalty reduction percentage applicable in respect of said LICENSED PRODUCT and patent or patents and the effective date thereof.

4.03 A LICENSED PRODUCT, or maintenance part therefor, which is made and sold by the CORPORATION or any of its SUBSIDIARIES and which is a ROYALTY-BEARING PRODUCT hereunder on account of one or more of WESTERN'S PATENTS, may be treated by the CORPORATION as not licensed and not subject to royalty hereunder if all of the following conditions are met:

(i) the purchaser is licensed under the same patent or patents, pursuant to another agreement, to have said LICENSED PRODUCT or part made;

(ii) the purchaser expressly advises the CORPORATION or its SUBSIDIARY, whichever effects the making and sale, in writing at or prior to (but in no event later than) the time of such sale that, in purchasing said LICENSED PRODUCT or part, it is exercising its own license or licenses under said patent or patents to have said LICENSED PRODUCT or part made; and

(iii) the CORPORATION retains such written advice and makes it available to WESTERN at the latter's request.

4.04 Only one royalty shall be payable hereunder in respect of any ROYALTY-BEARING PRODUCT. Royalty shall accrue hereunder on any LICENSED PRODUCT, or maintenance part therefor, upon its first becoming a ROYALTY-BEARING PRODUCT, and the royalty thereon shall become payable in accordance with the provisions of this Article IV upon the first sale, lease or putting into use thereof.

4.05 If any sale of a ROYALTY-BEARING PRODUCT shall be made by the CORPORATION or a SUBSIDIARY thereof to

(i) any company of which the CORPORATION is a SUBSIDIARY at the time of such sale, or

(ii) the CORPORATION or a SUBSIDIARY thereof or any other SUBSIDIARY of a company of which the CORPORATION is a SUBSIDIARY at the time of such sale,

royalty payable hereunder shall be computed on the FAIR MARKET VALUE of such ROYALTY-BEARING PRODUCT.

ARTICLE V

REPORTS AND PAYMENTS

5.01 The CORPORATION shall keep full, clear and accurate records with respect to ROYALTY-BEARING PRODUCTS. WESTERN shall have the right through its accredited auditing representatives to make an examination and audit, during normal business hours, not more frequently than annually, of all such records and such other records and accounts as may under recognized accounting practices contain information bearing upon the amount of royalty payable to it under this agreement. Prompt adjustment shall be made by the proper party to compensate for any errors or omissions disclosed by such examination or audit. Neither such right to examine and audit nor the right to receive such adjustment shall be affected by any statement to the contrary, appearing on checks or otherwise, unless such statement appears in a letter, signed by the party having such right and delivered to the other party, expressly waiving such right. */

5.02 (a) Within sixty (60) days after the end of each semiannual period ending on June 30th or December 31st, commencing with the semiannual period during which this agreement first becomes effective, the CORPORATION shall furnish to WESTERN a statement, in form acceptable to WESTERN, certified by a responsible official of the CORPORATION:

(i) showing all ROYALTY-BEARING PRODUCTS, by kinds of LICENSED PRODUCTS, which were sold, leased or put into use during such semiannual period, the NET SELLING PRICES of such ROYALTY-BEARING PRODUCTS or (where royalty is based on FAIR MARKET VALUES) the FAIR MARKET VALUES thereof and the amount of royalty payable thereon (or if no such ROYALTY-BEARING PRODUCT has been so sold, leased or put into use, showing that fact);

(ii) identifying, if royalty is reduced under provisions of Section 4.02, each LICENSED PRODUCT by its type and the patent or patents involved in such royalty reduction;

(iii) showing, by purchasers and kinds of LICENSED PRODUCTS, the monetary totals of the sales, to each purchaser exercising its own "to have made" license or licenses, of LICENSED PRODUCTS and maintenance parts in transactions of the character described in Section 4.03; and

(iv) identifying all transactions of the character described in Section 4.03.

(b) Within such sixty (60) days the CORPORATION shall, irrespective of its own business and accounting methods, pay to WESTERN the royalties payable for such semiannual period.

(c) Notwithstanding the provisions of Section 7.04(a) (v), the CORPORATION shall furnish whatever additional information WESTERN may

*/ If licensee insists on a non-Western auditor, third line, insert, after "representatives", -or, at the election of the CORPORATION, through a firm of certified public accountants proposed by WESTERN and accepted by the CORPORATION-.

reasonably prescribe from time to time to enable WESTERN to ascertain which LICENSED PRODUCTS (and maintenance parts therefor) sold, leased or put into use by the CORPORATION or any of its SUBSIDIARIES are subject to the payment of royalty to WESTERN, and the amount of royalty payable thereon.

5.03 Royalty payments provided for in this agreement shall, when overdue, bear interest at an annual rate of one percent (1%) over the prime rate or successive prime rates in effect in New York City during delinquency.

5.04 Payment to WESTERN shall be made in United States dollars to WESTERN'S Treasury Organization at 222 Broadway, New York, New York 10038, or at such changed address as WESTERN shall have specified by written notice. If any royalty for any semiannual period referred to in Section 5.02 is computed in other currency, conversion to United States dollars shall be at the prevailing rate for bank cable transfers on New York City as quoted for the last day of such semiannual period by leading banks dealing in the New York City foreign exchange market.

ARTICLE VI

TERMINATION, CANCELLATION AND SURRENDER

6.01 Any termination under the provisions of this Article VI by one party of licenses and rights of the other party shall not affect the licenses and rights of the terminating party and its sublicensees (or of AT&T and its sublicensees if WESTERN is the terminating party), nor the obligations of the CORPORATION under the provisions of Articles IV and V if it is the terminating party.

6.02 If WESTERN shall fail to fulfill one or more of its obligations under this agreement, the CORPORATION may, upon election and in addition to any other remedies that it may have, at any time terminate all licenses and rights granted to WESTERN and AT&T hereunder, by not less than six (6) months' written notice to WESTERN specifying any such breach, unless within the period of such notice all breaches specified therein shall have been remedied.

6.03 (a) If the CORPORATION shall fail to fulfill one or more of

(i) its obligations under Articles IV or V, or

(ii) its obligations under this agreement whereby WESTERN or AT&T fails to receive licenses or rights which it is entitled hereunder to receive under patents issued in the United States,

WESTERN may, upon election and in addition to any other remedies that it may have, at any time terminate all licenses and rights granted to the CORPORATION hereunder, by not less than six (6) months' written notice to the CORPORATION specifying any such breach, unless within the period of such notice all breaches specified therein shall have been remedied.

(b) Termination by WESTERN of licenses and rights granted to the CORPORATION shall terminate the obligations of the CORPORATION under the provisions of Articles IV and V relating to such terminated licenses and rights, except such obligations as to ROYALTY-BEARING PRODUCTS made, sold, leased or put into use prior to such termination.

6.04 (a) By written notice to WESTERN, the CORPORATION may cancel the licenses for any specified products granted hereunder to it under WESTERN'S PATENTS. Such cancellation shall be effective as of the date of giving said notice but shall not relieve the CORPORATION of its obligation to pay accrued royalties with respect to such specified products.

(b) By written notice to the CORPORATION, WESTERN or AT&T may cancel the licenses for any specified products granted hereunder to it under the CORPORATION'S PATENTS, such cancellation to be effective as of the date of giving said notice.

6.05 By written notice to WESTERN, specifying any of WESTERN'S PATENTS by number and date of issuance, the CORPORATION may

surrender and terminate all licenses and rights granted to it under such specified patent or patents or under any specified invention or inventions thereof. Such surrender and termination shall be effective as of a date specified in said notice which shall not be more than six (6) months prior to the date of giving said notice. As of said effective date, such specified patent or patents or invention or inventions shall cease to be among, or among the inventions of, WESTERN'S PATENTS for the purposes of this agreement without affecting obligations in respect of royalties accrued prior to said effective date.

6.06 (a) Every sublicense granted by a party or AT&T shall terminate with termination or cancellation of its corresponding license.

(b) Any sublicenses granted shall terminate if and when the grantee thereof ceases to be an ASSOCIATED COMPANY of WESTERN or AT&T or a SUBSIDIARY of the CORPORATION. Each LICENSED PRODUCT and each maintenance part, made by or for a SUBSIDIARY of the CORPORATION, and on which royalty has accrued but which remains not sold, leased or put into use at the time such SUBSIDIARY ceases to be a SUBSIDIARY of the CORPORATION, shall be deemed to have been put into use by such SUBSIDIARY immediately prior to such time at the place said LICENSED PRODUCT or part is then located.

(c) If an ASSOCIATED COMPANY'S relationship to a party or AT&T changes so that such ASSOCIATED COMPANY is no longer an ASSOCIATED COMPANY of such party or AT&T, licenses and rights acquired under the patents and patent rights of such ASSOCIATED COMPANY for inventions made prior to the date such relationship changed shall not be affected by such change.

6.07 Licenses, immunities and rights with respect to each LICENSED PRODUCT, and each maintenance part, made, sold, leased or put into use prior to any termination or cancellation under the provisions of this Article VI shall survive such termination or cancellation.

ARTICLE VII

MISCELLANEOUS PROVISIONS

7.01 With respect to patents or inventions owned jointly by the CORPORATION, or any of its ASSOCIATED COMPANIES, with any other person or persons who has or have granted, or who shall hereafter grant, to WESTERN or AT&T, licenses or other rights thereunder, the CORPORATION, to the extent that the licenses and rights so granted do not exceed the scope of the licenses and rights herein granted by the CORPORATION, consents to the grant of licenses and rights to WESTERN and AT&T under such patents and inventions by such other person or persons.

7.02 (a) Each party shall, upon written request from the other party sufficiently identifying any patent by country, number and date of issuance, inform the other party as to the extent to which any such patent is subject to the licenses, immunities and rights granted to such other party.

(b) If such licenses, immunities or rights under any such patent are restricted in scope, copies of all pertinent provisions of any contract (other than provisions of a contract with a government to the extent that disclosure thereof is prohibited under that government's laws or regulations) creating such restrictions shall, upon request, be furnished to the party making such request.

7.03 Upon written request from one party, the other party shall inform the requesting party which of said other party's patents cover inventions under which the United States Government holds a royalty-free license.

7.04 (a) Nothing contained in this agreement shall be construed as

(i) requiring the filing of any patent application, the securing of any patent or the maintaining of any patent in force; or

(ii) a warranty or representation by any grantor as to the validity or scope of any patent; or

(iii) a warranty or representation that any manufacture, sale, lease, use or importation will be free from infringement of patents other than those under which and to the extent to which licenses or immunities are in force hereunder; or

(iv) an agreement to bring or prosecute actions or suits against third parties for infringement; or

(v) an obligation to furnish any manufacturing or technical information or assistance; or

(vi) conferring any right to use, in advertising, publicity or otherwise, any

name, trade name or trademark, or any contraction, abbreviation or simulation thereof; or

(vii) conferring by implication, estoppel or otherwise upon any grantee any license or other right under any patent, except the licenses and rights expressly granted to such grantee; or

(viii) an obligation upon any grantor to make any determination as to the applicability of any patent to any product of any grantee or any of its ASSOCIATED COMPANIES; or

(ix) a release for any infringement prior to the effective date hereof.

(b) Neither party nor AT&T makes any representations, extends any warranties of any kind or assumes any responsibility whatever with respect to the manufacture, sale, lease, use or importation of any LICENSED PRODUCT, or part therefor, by any grantee, any of its ASSOCIATED COMPANIES, or any direct or indirect supplier or vendee or other transferee of any such company, other than the licenses, immunities, rights and warranties expressly herein granted.

7.05 Neither this agreement nor any licenses or rights hereunder, in whole or in part, shall be assignable or otherwise transferable.

7.06 Any notice, request or information shall be deemed to be sufficiently given when sent by registered mail addressed to the addressee at its office above specified (and when addressed to WESTERN, to the attention of its Patent Licensing Organization) and any royalty statement shall be deemed to be sufficiently furnished when sent by registered mail addressed to WESTERN'S Treasury Organization at 222 Broadway, New York, New York 10038, or at such changed address as the addressee shall have specified by written notice.

7.07 This agreement sets forth the entire agreement and understanding between the parties as to the subject matter hereof and merges all prior discussions between them, and neither of the parties shall be bound by any conditions, definitions, warranties, understandings or representations with respect to such subject matter other than as expressly provided herein, or in any prior existing written agreement between the parties, or as duly set forth on or subsequent to the effective date hereof in writing and signed by a proper and duly authorized representative of the party to be bound thereby.

7.08 The construction and performance of this agreement shall be governed by the law of the State of New York.

IN WITNESS WHEREOF, each of the parties has caused this agreement to be executed in duplicate originals by its duly authorized representatives on the respective dates entered below.

WESTERN ELECTRIC COMPANY, INCORPORATED

By .....
Director of Patent Licensing

Date .....

Attest:

[SEAL]

.....
Secretary

.....

By .....

Title .....

Date .....

Attest:

[SEAL]

.....
Secretary

GENERAL DEFINITIONS APPENDIX

ASSOCIATED COMPANIES of AT&T are The Southern New England Telephone Company, a Connecticut corporation, and its SUBSIDIARIES, Cincinnati Bell Inc., an Ohio corporation, and its SUBSIDIARIES, and SUBSIDIARIES of AT&T other than WESTERN and its SUBSIDIARIES.

ASSOCIATED COMPANIES of the CORPORATION are SUBSIDIARIES of the CORPORATION, companies presently having the CORPORATION as a SUBSIDIARY and other SUBSIDIARIES of such companies.

ASSOCIATED COMPANIES of WESTERN are SUBSIDIARIES of WESTERN.

The CORPORATION'S PATENTS means all patents issued at any time in the United States for

(i) inventions made prior to the termination of the FIVE YEAR PERIOD and owned or controlled at any time during the FIVE YEAR PERIOD by the CORPORATION or any of its ASSOCIATED COMPANIES,

(ii) inventions made during the FIVE YEAR PERIOD, solely or jointly with anyone, and in the course of their employment by employees of any such company who are employed to do research, development or other inventive work, and

(iii) any other inventions made prior to the termination of the FIVE YEAR PERIOD, with respect to which and to the extent to which any such company shall at any time during the FIVE YEAR PERIOD have the right to grant the licenses and rights which are herein granted by the CORPORATION.

FAIR MARKET VALUE means the NET SELLING PRICE which the CORPORATION or any of its SUBSIDIARIES, whichever effects the sale, lease or use of the product or maintenance part, would realize from an unaffiliated buyer in an arm's length sale of an identical product or maintenance part in the same quantity and at the same time and place as such sale, lease or use.

FIVE YEAR PERIOD means the period commencing on the effective date of this agreement and having a duration of five years.

LICENSED PRODUCT means, as to any respective grantee,

(i) any product as such, or

(ii) any product which is any specified combination,

of the kinds listed in Section 2.01 or 2.02 of this agreement. Although the term does not mean, and although licenses are not granted for, any other combination, a LICENSED PRODUCT

(iii) shall not lose its status as such on account of, and

(iv) shall not cause an unlicensed combination to infringe the grantor's patents (i.e., WESTERN'S PATENTS or the CORPORATION'S PATENTS, as the case may be) solely on account of,

such LICENSED PRODUCT being made, sold, leased or put into use as part of an unlicensed combination.

NET SELLING PRICE means the gross selling price of the ROYALTY-BEARING PRODUCT in the form in which it is sold, whether or not assembled (and without excluding therefrom any components or subassemblies thereof, whatever their origin and whether or not patent impacted), less the following items but only insofar as they pertain to the sale of such ROYALTY-BEARING PRODUCT by the CORPORATION or any of its SUBSIDIARIES and are included in such gross selling price:

(i) usual trade discounts actually allowed (other than cash discounts, advertising allowances, or fees or commissions to any employees of the CORPORATION, a SUBSIDIARY of the CORPORATION, a company of which the CORPORATION is a SUBSIDIARY at the time of the sale, or any other SUBSIDIARY of a company of which the CORPORATION is a SUBSIDIARY at the time of such sale);

(ii) packing costs;

(iii) import, export, excise and sales taxes, and customs duties;

(iv) costs of insurance and transportation from the place of manufacture to the customer's premises or point of installation;

(v) costs of installation at the place of use; and

(vi) costs of special engineering services not incident to the design or manufacture of the ROYALTY-BEARING PRODUCT.

ROYALTY-BEARING PRODUCT means any LICENSED PRODUCT of the kinds specified in Section 2.01 of this agreement (other than any LICENSED PRODUCT for which all the licenses granted in this agreement are at a royalty rate of zero percent (0%)), and any maintenance part therefor,

(i) which upon manufacture includes, or the manufacture of which employs, any invention of any of WESTERN'S PATENTS in force at the time and place of such manufacture, or

(ii) which includes when sold, leased or put into use, or the use of which employs, any invention of any of WESTERN'S PATENTS in force at

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the time and place of such sale, lease or use,

other than

(iii) inventions under which the United States Government holds a royalty-free license if such LICENSED PRODUCT or part is contracted for, directly or indirectly, by the United States Government, or by another national government with funds derived through the Military Assistance Program or otherwise through the United States Government, and

(iv) inventions employed in the manufacture of, or included in, such LICENSED PRODUCT or any original part thereof, or such maintenance part therefor or any original part thereof, by a direct or indirect supplier of the CORPORATION or any of its SUBSIDIARIES, but only to the extent such supplier has exercised its own licenses granted by WESTERN under patents for such inventions to so employ or include said inventions.

SUBSIDIARY means a company the majority of whose stock entitled to vote for election of directors is now or hereafter controlled by the parent company either directly or indirectly, but any such company shall be deemed to be a SUBSIDIARY only so long as such control exists.

WESTERN'S PATENTS means all patents issued at any time in the United States for

(i) inventions made prior to the termination of the FIVE YEAR PERIOD and owned or controlled at any time during the FIVE YEAR PERIOD by AT&T, WESTERN or any of their SUBSIDIARIES,

(ii) inventions made during the FIVE YEAR PERIOD, solely or jointly with anyone, and in the course of their employment by employees of any such company who are employed to do research, development or other inventive work, and

(iii) any other inventions made prior to the termination of the FIVE YEAR PERIOD, with respect to which and to the extent to which any such company shall at any time during the FIVE YEAR PERIOD have the right to grant the licenses and rights which are herein granted by WESTERN;

provided, however, that said patents do not include those issued for inventions made by employees of any SUBSIDIARY of WESTERN or AT&T exclusively engaged in the performance of contracts with the Energy Research and Development Administration of the United States.

[FR Doc.76-19524 Filed 7-9-76;8:45 am]

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CODE OF FEDERAL REGULATIONS

(Revised as of April 1, 1976)

Title 19—Customs Duties $5.65

Title 20—Employees' Benefits (Part 400–End) 7.50

Title 21—Food and Drugs (Parts 10–199) 5.20

Title 24—Housing and Urban Development (Part 500–End) 6.90

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